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ABSTRACT

The final report of a 3 year project to improve the quality of life of mentally retarded, cerebral palsied, and epileptic persons in Region III is presented. The first section details the efforts of the project staff in providing competitive employment opportunities or sheltered employment for 40 severely disabled persons. Equipment modification or job alterations which enabled severely disabled persons to perform job tasks are illustrated. Section 2 examines the evaluation process and the prevocational training of 33 severely disabled clients. Methods of examining for and remediating nerve compression in 13 clients are presented in the third section. The fourth section summarizes efforts to solve communication problems among 27 Region III clients. Equipment to improve the independent functioning in a total of 59 clients is reviewed in the fifth section and methods of increasing clients' self care abilities are explored in the sixth section. Dissemination materials and training activities are described in the seventh section. The final section charts client characteristics. Among appendixes are client case histories, an article on the use of a helmet with seizure prone individuals, and instructions for the construction of a handguard. (PHR)

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JOBS AND SELF-SUFFICIENCY:

GOALS OF THE PROJECT,
"TECHNICAL SUPPORT SERVICES TO THE DEVELOPMENTALLY DISABLED, REGION III"

Final Report

October 1976 to September 1979

by:

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CONTENTS

INTRODUCTION 1

I. VOCATIONAL

1. Competitive Employment 3
2. Sheltered Employment 10

II. PREVOCATIONAL

3. Evaluation and Realistic Training 23

III. MEDICAL

4. Nerve Compression 29

IV. COMMUNICATION

5. Communication 31

V. INDEPENDENT FUNCTIONING

6. Head Protection 41
7. Uncontrolled Drooling 44
8. Poor Head Control 46
9. Poor Seating, Positioning and Stabilizing 48
10. Hand Protection from Self-Abusive Behavior 52
11. Difficulty with Mobility, Ambulation, Transfers 54
12. The "Carlo Principle" Therapeutic Toy 57

VI. ACTIVITIES OF DAILY LIVING

13. Self-Care in Dress and Grooming 59
14. Self-Care in Hygiene and Toileting 62
15. Difficulty with Feeding and Oral Motor Control 64

VII. DISSEMINATION AND TRAINING

16. Resource Materials 67
17. Training Activities 72

VIII. CLIENT CHARACTERISTICS

18. Client Characteristics 83

APPENDICES

A. Lighted Picture Box 91
B. Three Case Histories of N.V.T.C. Residents Learning to Use Aids for Nonoral Communication 93
C. Concealable Helmet for Seizure-Prone Individuals 95
D. Instructions for Constructing Hand Guards 101

INTRODUCTION

The Job Development Laboratory (JDL) was established in 1973 as a result of a successful four year "Homebound Employment Project" (HEP) at The George Washington University's Rehabilitation Research and Training Center (RT-9). During this period, the Laboratory staff conducted nine research and demonstration projects in the areas of job development, job analysis, environmental modifications and placement of severely disabled persons. The staff also recognized that many congenitally disabled persons could be gainfully employed in a cost-effective way if comprehensive rehabilitation services (communication skills, mobility, positioning, feeding, dressing, hygiene, prevocational and vocational skills) were initiated in a much earlier phase of their activities.

The desire to implement this enabled the Job Development Laboratory to obtain a grant from the Region III Developmental Disabilities Office in Philadelphia, Pennsylvania to demonstrate increased self-care scores through "Bio-engineering Services to the Developmentally Disabled Adolescent." This project was conducted from September 1974 through June 1975 with developmentally disabled students at the Sharpe Health School (District of Columbia public school for handicapped children). After a one year demonstration period, the project staff expanded its services to multiply-handicapped developmentally disabled residents at Forest Haven (District of Columbia institution for the care of mentally retarded persons) from June 1975 to June 1976. During this period the project staff proved that through the use of simple aids and techniques many developmentally disabled persons can gain independence in their activities of daily living, and by means of prevocational and vocational supports many of them can participate in vocational activities in sheltered and competitive employment.

With this experience, the project staff launched the three year project (October 1976 through September 1979), "Technical Support Services to the Developmentally Disabled of Region III," which is the subject of this report. The overall purpose of the project was to improve the quality of life for Region III persons who are developmentally disabled, specifically the mentally retarded, cerebral palsied, and epileptic.

During the initial phase of the project, it had been determined that a survey of Region III facilities serving the developmentally disabled population was the most comprehensive and unbiased method of identifying problems in the medical, life skills, prevocational and vocational areas among this group. A total of 404 survey questionnaires were mailed to Region III facilities with 173 responses (43 percent). From a brief review of the responses, it was evident that greater clarification was needed before determining whether or not a frequently cited problem was appropriate as a target issue. To aid in this clarification, the project staff began re-contacting respondent facilities (which included residential institutions, University Affiliated Facilities, schools of special education, activity centers and sheltered workshops), making site visits, and seeking the interpretation of local experts. Through this process the most common problems faced by Region III facilities were identified and considered for technical solutions.

This report follows a problem-solution format. It is organized into eight parts, each devoted to a target problem and its respective solutions (I - Vocational; II - Prevocational; III - Medical; IV - Communication; V - Independent Functioning; VI - Activities of Daily Living; VII - Dissemination; VIII - Client Characteristics). The problems cited by Region III facilities are discussed in the shaded areas of the text. The solutions achieved through project efforts in collaboration with Region III facilities and developmentally disabled residents are discussed in the sections following each problem area.

During the project period a quarterly newsletter, Response, was published to disseminate the project results locally, regionally and nationally -- our mailing list grew to over 800 people and institutions. The project staff also conducted workshops at various Region III facilities to share technical information and teach facilities' staffs how to identify materials to fabricate devices and aids. The project staff also received a great deal of feedback from Region III facilities indicating that they had implemented many of our aids, devices and techniques to facilitate independent functioning of their clients.

The project staff took an active role in publishing articles, books, and generating a videotape for wider dissemination of our findings. Two of these books are now used by three universities as texts for their speech therapy and special education classes. Dissemination through parent conferences and other workshops is discussed in Part VII of this report.

Though the project activities have been discontinued, it is the belief of the project staff that the project results will remain active in many Region III facilities to improve functional aspects of developmentally disabled persons.

PART I

VOCATIONAL

1. COMPETITIVE EMPLOYMENT

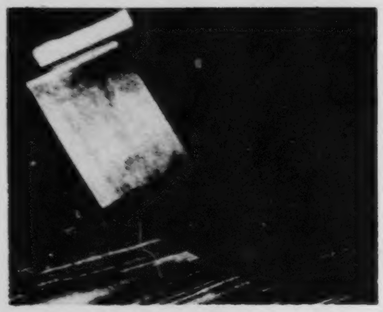
Problem

"Few employment opportunities" was the chief vocational complaint throughout the Region. Insofar as competitive employment is concerned, this involves difficulties that range from not knowing what are realistic possibilities, particularly for severely disabled persons, to needing job development and job placement expertise, to lack of technical "know-how" for job redesign that would in turn enhance the capabilities and job performance of severely disabled persons.

Region III Involvement: *20 clients*
11 facilities

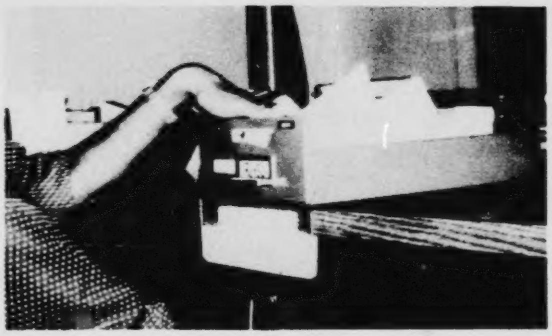
Developmentally disabled clients with whom the staff worked, all labelled severely disabled, represented a broad spectrum of vocational difficulties. Some individuals and their respective DVR counselors required complete assistance in all aspects of vocational rehabilitation -- from determining an appropriate job; providing vocational counseling and guidance; arranging for tutoring and training; job development; job modification; to follow-along for post-placement changes. In other cases, it was necessary to intervene earlier, as an advocate, and then to determine ways to maximize a person's abilities for rehabilitation planning. For example, we helped determine methods for a former sheltered worker to do clerical tasks required on a volunteer job with the intent of both permitting the client needed work socialization experiences and persuading the DVR counselor of the client's realistic job potential. Often it was necessary for our staff to consult not only with the DVR counselor but with his/her support staff and with training facility personnel; we did this to educate them as to how a severely disabled person could -- with their flexibility and assistance -- perform in their training programs. Once this involved personnel at a comprehensive rehabilitation center and another time a high school career training facility.

In still other cases the staff performed homebound evaluations and subsequent job modifications, provided post employment job modifications to prevent an individual from losing his job, and made arrangements for on-the-job training. The following are some examples of modifications we devised to enable developmentally disabled persons to perform job tasks. Although these pictures depict aids that were either purchased or fabricated, we emphasize that seeking alternate methods (rather than aids) was always our first choice. Indeed, figuring out a different method resolved many functional difficulties we encountered and eliminated the need of aids. One example of an alternate method was to devise a way to separate and reinsert books on library shelves using one hand.



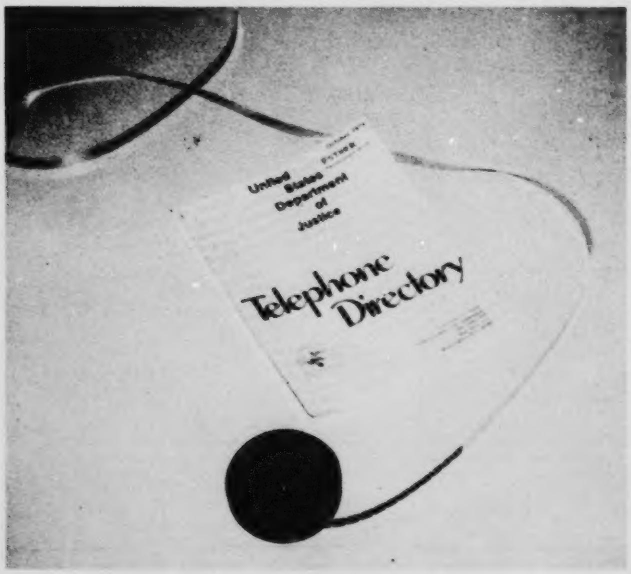
The computer readout holder (left and below) was devised to eliminate difficulty handling the bulky book and flipping through the pages for an individual assuming a library assistant position in a private university.

This card file insert (shown at right and in more detail on the following page) was constructed to eliminate sliding cards. Sliding cards is an added inconvenience during a filing task for the worker with slowed movement and difficulty in pinching. The insert separates cards at given intervals and keeps them upright with thin metal supports.



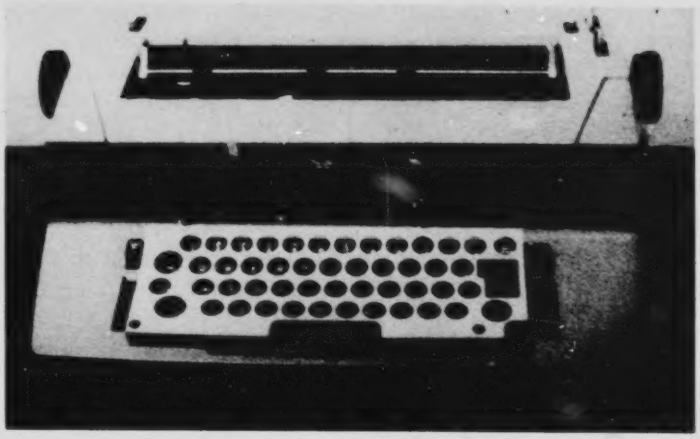
Card file insert

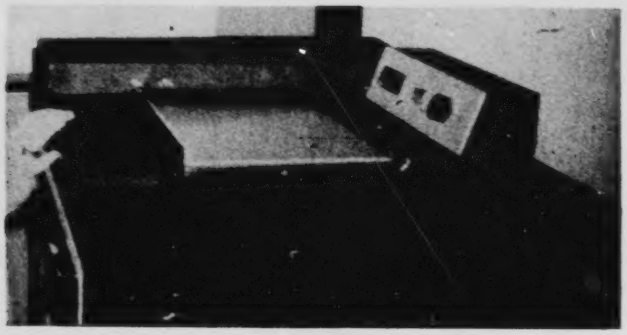
An agency's telephone directory (below) was microfilmed to eliminate separating and turning pages from a receptionist job which the applicant was otherwise well qualified to perform.


United States Department of Justice
Telephone Directory

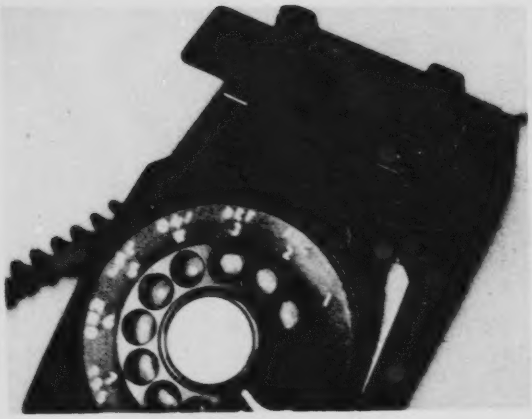
Hard-to-grasp knob was replaced by a lever on a microfilm viewer to make the phone directory readily accessible. An extended platform on the viewer served as a handrest during operation, and a telephone headset provided by the phone company freed the worker's hands to use the viewer.

A typewriter keyguard, available from IBM, separates keys to eliminate striking the wrong one due to tremor, uncontrolled movement or poor aim by finger, headstick or mouthstick. The keyguard also provides a platform above the keys on which the wrists can be rested while typing.

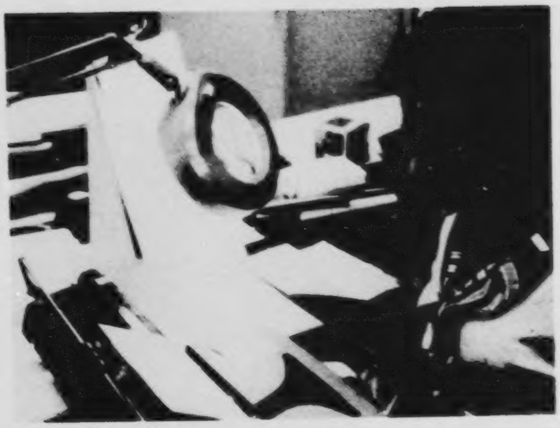




A Xerox paper guide eliminated inserting papers into the copier out of line due to involuntary movement.

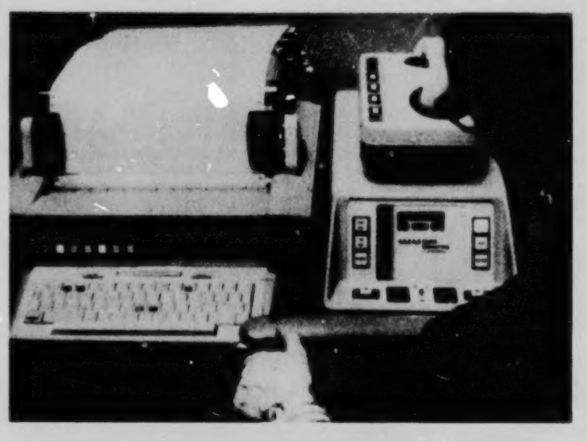


A door hinge served to depress the phone connector and can be operated with a gross rather than fine movement of the hand. It is used in conjunction with either a gooseneck or Luxo extension arm to hold the phone receiver. This arrangement eliminates picking up, holding and replacing the receiver, permitting someone with difficulty grasping or uncontrolled movements to quickly answer the phone.



An illuminated magnifier by Luxo eliminates errors due to poor vision. Set behind the typewriter, it can easily be repositioned when necessary over the typewriter copy by the typist.

A new way of positioning himself reduced uncontrolled motions that impaired this computer operator's typing ability. By setting his chair sideways in front of the terminal's keyboard, this left-handed worker stabilized his left arm on the wheelchair armrest, with his hand free to strike keys.



A telephone amplifier available from Radio Shack permits this hearing-impaired person to use the phone. A private office and rearranging the work surface allow this worker to use the phone, write messages, and collect orders with his feet.

A denim bag allows this clerical worker to transport papers and small items, which he would otherwise have difficulty carrying due to poor motor control. At a subsequent job, a cart replaced the bag for transporting items.

To help these individuals become employed we formulated a job placement model for physically handicapped, developmentally disabled persons. We relied heavily on our previously developed (and broader) job placement model for severely disabled persons and on the professional skills of an interdisciplinary team. That earlier model went beyond the process traditionally used by rehabilitation practitioners and included: client evaluation; job development and employer orientation; client-job matching; training; environmental modification and job restructuring (also called job redesign); job placement; and follow-along services with both employer and employee. This model was expanded for the developmentally disabled to include: proper positioning for work; modifying vocational evaluation test protocol, and exploring alternate methods and devices to enhance the client's abilities during evaluation; on-site work socialization experiences; training in use of alternate methods or devices; and one-to-one on-the-job training. It must be emphasized that all steps may not be required in each case.

By working with these severely involved, developmentally disabled persons it became evident that both job possibilities and job modifications were highly individual, varying with the clients' abilities, available methods of maximizing those abilities (both existing and those to which the individual had access), and the local job market. Since a generalizable tool for providing technical assistance to the Region was limited, we decided upon another approach. We decided to visually depict examples of severely disabled competitive workers, with accompanying descriptions of how our staff intervened, as well as methods and available devices which enabled these workers to function on their jobs.

A training videotape, "Opportunity to Work: Job Development for Severely Disabled Cerebral Palsied Persons," which highlighted three case histories of our long-term intervention, was produced. The videotape was then announced through Response, made available for loan and purchase, and used in a number of training programs.

While an effective training tool, the videotape often raises questions that it does not answer, and it was felt that a broader and more specific resource was desirable. Therefore, a book, now under production, was conceived. It will include a description of our job placement model and intervention strategies, describe a number of severely involved developmentally disabled workers at a variety of jobs, and contain a listing of alternate methods and commonly used commercially-available devices. This technical resource is scheduled for completion in February 1980.

Numerous training programs were conducted, including a large Regional conference which is being planned. These programs are listed in a later section of this report, Dissemination. Descriptions of our team's approach with individual clients were also included in two issues of Response.

2. SHELTERED EMPLOYMENT

Problems

Sheltered employment concerns focused on two areas: (1) need for more sheltered contract work and learning how to procure and price it, and (2) increasing the productivity and satisfaction of the workers.

Region III Involvement: *20 clients*
14 facilities

The greatest problem cited by the 58 Region III workshops and work activity centers which responded to our January 1977 survey was the need for more sheltered jobs -- including work of greater volume, longer duration, and more diversity to permit employment of the growing population of severely as well as other developmentally disabled persons; varied training experiences; steadier working hours; and increased income. Virtually none of the workshops were able to maintain 100 percent employment of their sheltered workers (100% employment = all workers engaged full-time in remunerative work). Such recurrent under-employment often occurred simultaneously with complaints of "behavioral difficulties" and "poor motivation." Lack of manpower planning, lack of marketing expertise of staff, lack of appreciation for the effectiveness of marketing techniques, and limited budgets invariably contributed to difficulty maintaining full workshop employment. Over half of the survey respondents, 32 sheltered workshops, had no staff person assigned the responsibility of marketing on a full-time basis. Only four had full-time marketing directors with business training or experience; curiously, two of these four facilities were among the five facilities which said they wanted no additional work because they had too many contracts. Greater expertise in contract procurement could lead as well to seeking of jobs that would enhance the abilities of (severely disabled) workers or that could be used as transitional work experiences.

The Job Development Laboratory staff explored ways to provide technical marketing assistance in preparation for helping Regional sheltered workshops provide steady work for their sheltered workers. Our intent was to combine this with training in our expertise of adapting jobs so that persons with severe physical disabilities could benefit from our intervention.

Phone discussions were held with Ed Malone, a marketing specialist with fifteen years of successful consultant experience with sheltered workshops. We then convened a meeting on August 21, 1978 to clarify needs and type of assistance to offer. Fourteen sheltered workshop professionals responsible for marketing were invited to attend, along with Ed Malone and Peter Vorac (as Director of the University of Maryland's Center for Rehabilitation and Manpower Studies, Peter Vorac was invited in the event that his Center's training program would meet the Regional need for marketing assistance; as it turned out, several of the workshop participants had attended Peter Vorac's training program on marketing).

At the meeting's conclusion, it was felt that no existing marketing training -- short of each facility hiring a trained marketing specialist as a consultant or staff member -- provided the element instrumental to implementing training: on-site professional follow-along support. Optimally, a program would also: (a) address how to gain critical support for the marketing program by the workshop board members and director; (b) make high-cost professional consultation affordable to workshops with limited budgets (those unable to employ or engage a consultant); and (c) provide training in work restructuring and job adaptation to the marketing staff. With these factors in mind, we developed a proposed demonstration program. The diagram below outlines the program, targeted for 16 to 25 Region III sheltered workshops (serving a minimum of 480 sheltered workers), and provides a time table. The schedule of on-site follow-along support by the professional marketing consultant subsequent to initial training is the hallmark of this unique program.

PROPOSED MARKETING DEMONSTRATION PROGRAM (OUTLINE)

	deadline
Announcement of demonstrated program to Regional facilities; selection of 25 participating workshops with diverse backgrounds.	September 1978
Program #1 (one day): Orientation to marketing directors and their immediate supervisors or directors.	October 15, 1978
Pre-training data collection about facilities' current marketing program/practices and impact on their clients. This will provide a baseline data.	November 1, 1978
Program #2 (three-four days): Training in marketing, sales and job adaptations; planning of individual marketing programs for each facility.	November 15, 1978
First on-site visit (two days each) to implement marketing program (to follow Program #2 within one to six weeks).	November 21 - December 31, 1978

(continued)

Proposed Marketing Demonstration Program (continued)

Second on-site visit (one day each) to provide follow-on services on the basis of problems faced by the facilities' marketing director (to follow first visit by six weeks).	January 15 - February 15, 1979
Progress Assessment #1 of implementation of marketing program.	January 15 - February 15, 1979
Third on-site visit (half-day each) to monitor/alter marketing strategy if required (to follow second visit by six weeks).	March 1 - April 15, 1979
Progress Assessment #2 of sales output and related benefits to the clients.	March 1 - April 15, 1979
Final Assessment (#3) of program implementation, sales output and related benefits to the clients.	August 15, 1979

After the August 21 meeting, mention of the proposed marketing program in the September 1978 issue of Response resulted in 21 Regional requests to be involved in that program.

However, upon submitting the program to the Regional office, we learned that supplemental funds were unavailable. The staff therefore sought direction from our Advisory Board at our November 1978 meeting. It was the concensus of the advisers that we offer the marketing program and proposal intact to state vocational rehabilitation agencies for them to develop and fund.

Mr. Charles Lovely, Chief of Staff Development with the West Virginia Division of Vocational Rehabilitation, expressed interest in conducting the program for three (rather than 15 to 25) facilities. Since this raised the cost from about $400.00 to about $1,100 per participating facility, Mr. Lovely declined to be involved unless the cost per facility could be reduced. The matter was referred to Mr. Ed Malone for his consideration.

Also Ms. Martha Worley, Projects Coordinator of the Pennsylvania Bureau of Vocational Rehabilitation, expressed interest in conducting the marketing program as a cooperative venture on a statewide basis. She was provided with a copy of the program on January 3, 1979, but a decision to conduct the program was not communicated to this office, despite our repeated contact with her office.

Individuals interested in initiating a marketing training program may contact Ed Malone directly at: E.A. Malone and Associates, Inc., P.O. Box 413, Westwood, New Jersey 07675.

Where sheltered work serves as long-term employment, technical assistance is needed in job simplification and job modifications to make contract work suitable for severely -- and in some cases less severely -- involved sheltered workers; to provide for increased wages from existing contract work by making workers more productive; and to provide for greater worker satisfaction by enabling workers to do tasks they find most interesting.

Initially, from the survey forms, the staff identified the most common workshop job tasks throughout the Region; this was done so that fixtures developed could then be generalized to impact on the largest number of prospective workers. Washington metropolitan area workshops having similar contract work and having multiply-handicapped, developmentally disabled clients were then contacted so the staff could devise production fixtures and test them with local clients.

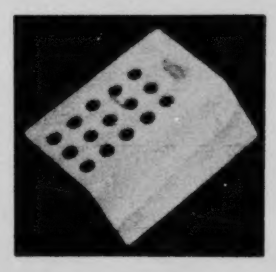
To determine effectiveness of using the fixtures, workshop staffs were asked to measure their clients' productivity first without the fixture and then to compare it with clients' productivity using the fixture (after a similar training period in both cases so unfamiliarity with the task or fixture would not bias results). In some cases fixtures were found to be ill-suited and were changed or eliminated. In most cases, however, fixtures produced a striking improvement in productivity, ranging from a 12 percent to a 100 percent increase. Moreover, in every case, fixtures designed by the project staff enabled some workers to perform jobs they previously had been unable to do, even in part. To quote one report, "We had a client on each job who went from 'couldn't do' to 'could do and earn money' with respective aid." Many facilities realized that fixtures benefitted not only their multiply disabled clients, but others as well, and requested duplicates or asked to be taught to make fixtures themselves. In fact, this led to development of training workshops entitled "Increasing Productivity of Workers in Sheltered Industry." At these workshops the staff also offered advice on the most appropriate tables and chairs for minimum fatigue; on bathroom accessibility or alternatives for wheelchair mobile persons; and on independent feeding as for an individual whose uncontrollable motion causes mutilation of sandwiches when he attempted to eat.

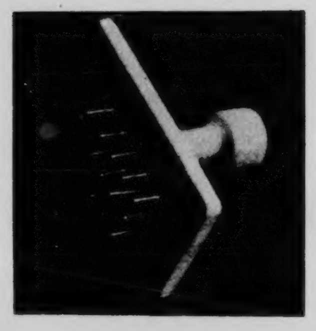
Some of the fixtures devised, along with brief descriptions, include the following:

The small parts counting aids (shown on the following page) permit exact counting and handling of nuts, bolts and other small metal items for packaging. Exact counting is difficult for some mentally retarded workers, and manipulating small parts for some physically disabled workers. Items are brushed across the holder and fall into shaped holes. When all the holes are filled, the excess items are brushed off. The magnetized lifter is then used to transport parts to a box or bag.

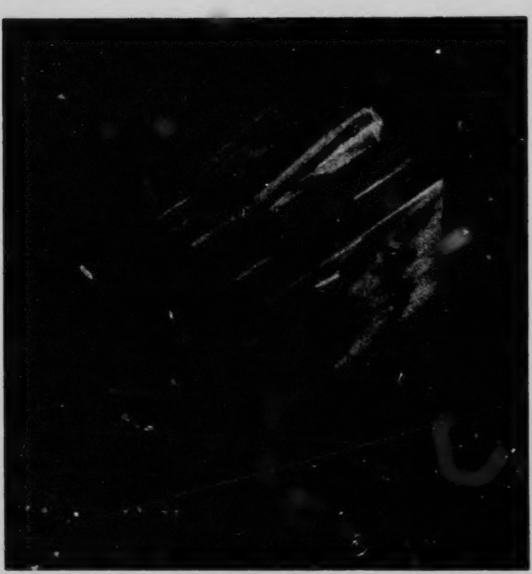
Small parts counting aids (see description on previous page)

holder

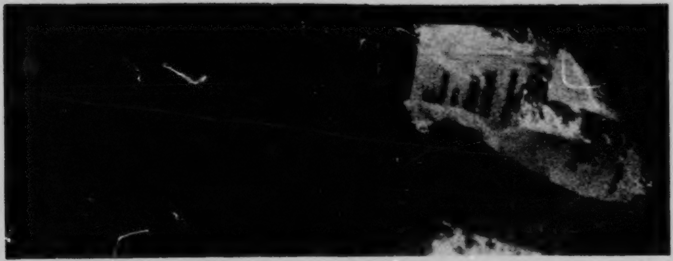




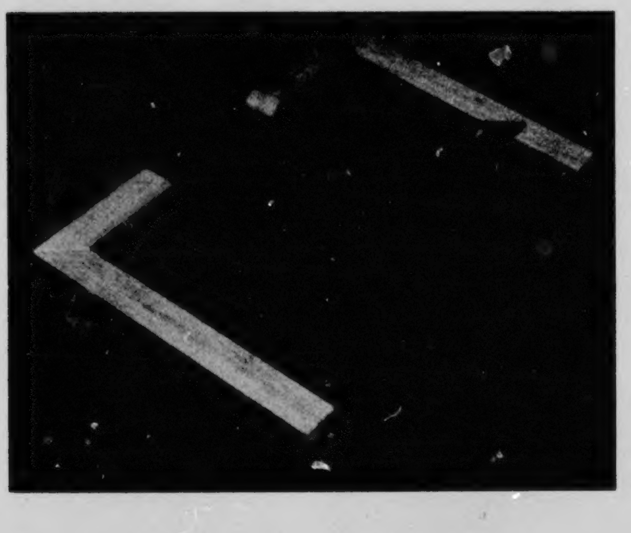
lifter

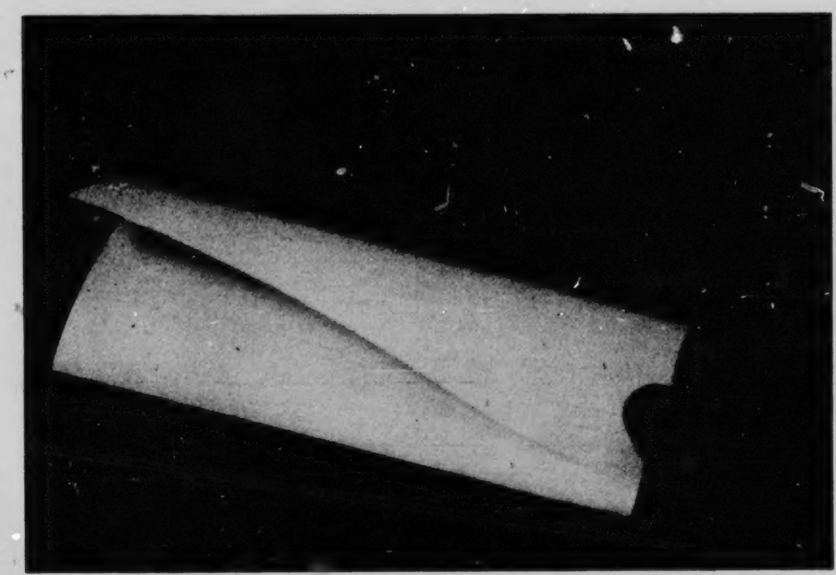


This telephone shoulder rest assembly guide (left) enabled a one-handed worker to line up, hold and screw together parts of a telephone shoulder rest. This wooden holder has slots shaped to hold the parts in the correct position for joining. The guide is kept from slipping by being placed on a piece of Dycem friction material.

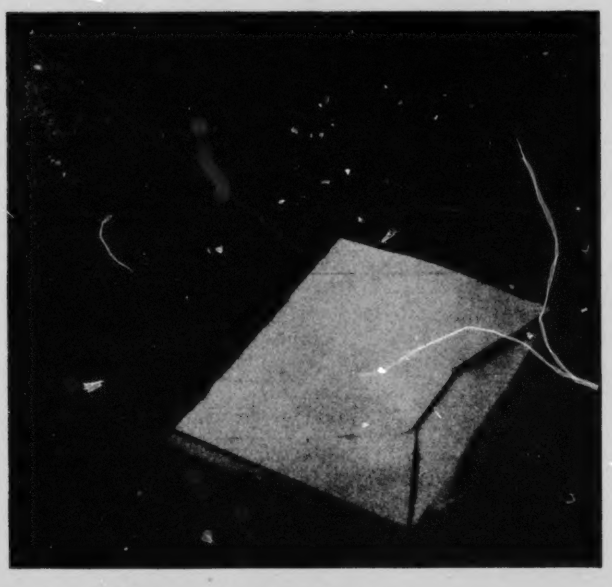


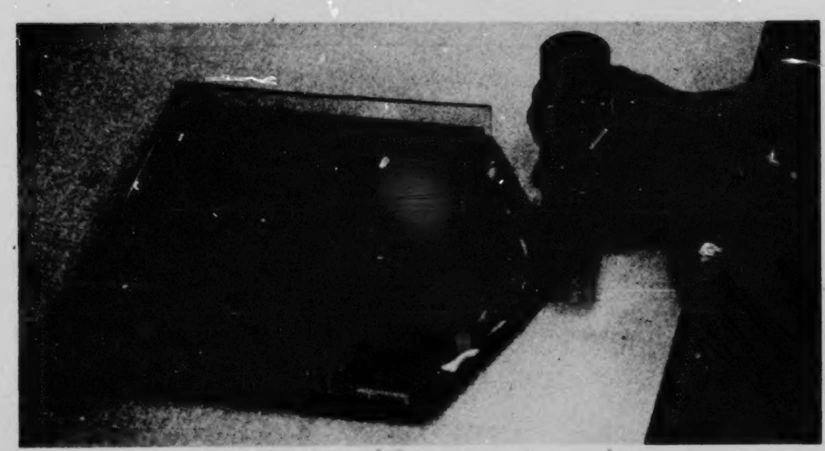
The plastic airline headphone bagger (above) eliminated the need to use two hands for this operation by eliminating the need to keep the headset coiled while opening a slippery polyethelene packaging bag. A polyethelene bag is slid over the "tongue" of the bagger, holding the bag open. The trough at the other end makes coiling and sliding the headset into the bag easier and faster, even for one-handed operation. A non-skid base prevents sliding and instability of the device while in use.



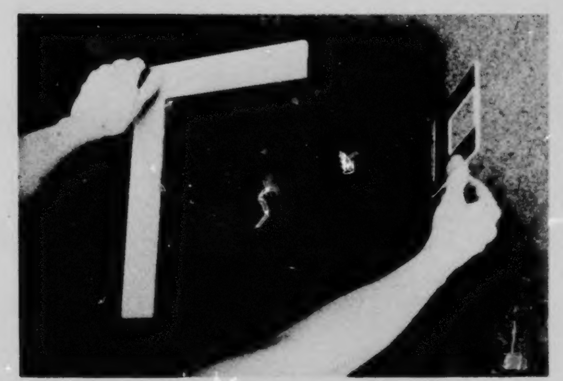


For large mailings, accurate folding can be difficult and time consuming. This folding guide can be used with individual sheets or a stack of sheets of paper. The clear folding edge is hinged so that sheets may be easily inserted. The folding edges are tapered for sharp creasing, and a cut-out on the right side of the plastic folding edge allows folded pages to easily slip off the guide.

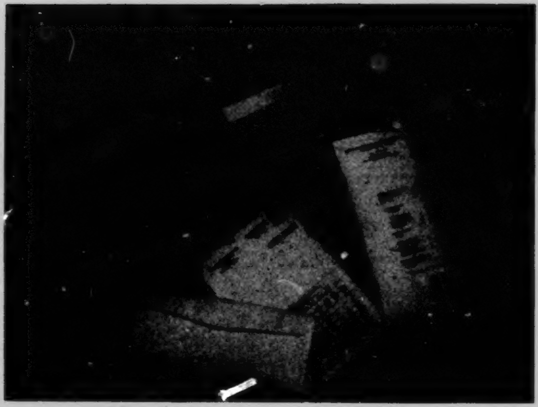




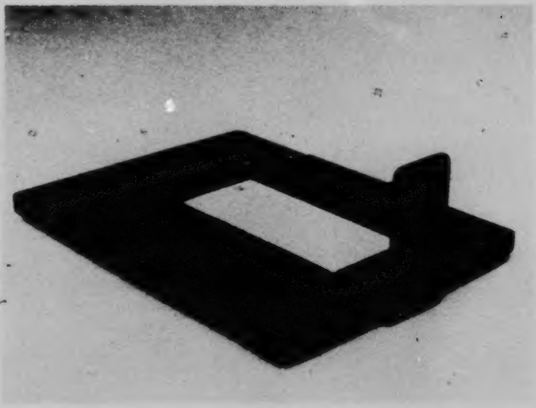
An envelope sealing guide with a hinged cover allows envelopes of a certain size to be inserted, exposing only the gummed flap. This eliminates the possibility of some workers soaking the entire envelope instead of just the gummed flap. Shown in the hand of the person in the above photograph is a bottle used to moisten the flap. Conventional tools of this sort, made of flexible plastic, tended to encourage squeezing, especially by those with uncontrolled movements. A glass spice bottle with a modified cap restricts water flow and solves the problem.



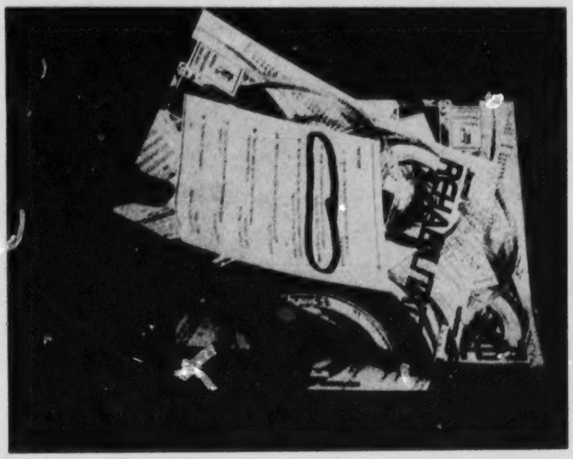
Blind and movement-impaired workers are able to accurately label envelopes of various sizes using this labeling guide. Constructed partly of magnetape, the right-angle stop bar on the left can be repositioned to adhere to the steel base. A knob makes it easier to readjust the bar to properly center envelopes of different sizes beneath the clear label guide. The clear plastic label guide (on the right) has a knob and hinges for easy insertion and removal of envelopes.



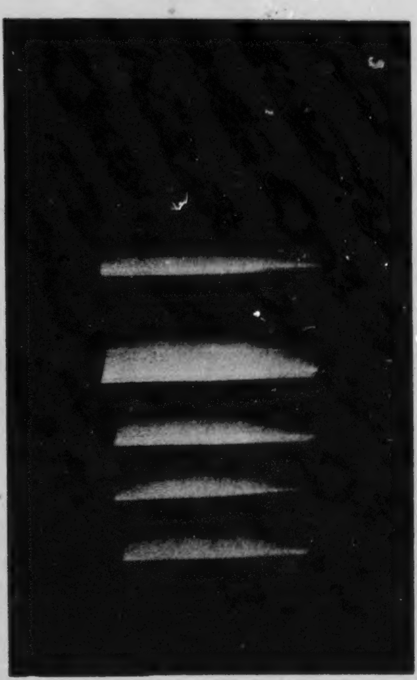
A later model, below, has an "L" shaped clear plastic label guide for labels of various sizes and is height-adjustable to accommodate stacks of envelopes or books.

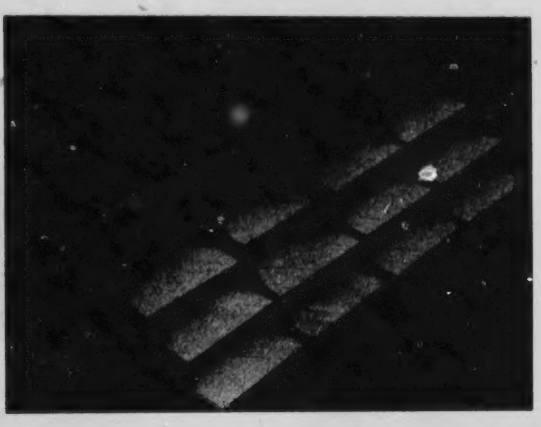


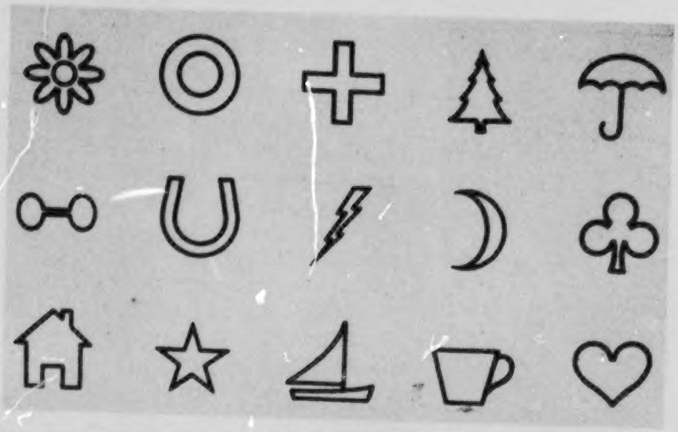
This collator, a low-cost replica of a popular printer's aid, helps organize groups of sheets in preparation for stapling. Cutouts in the sides and base allow easy removal of the stacked papers. The aid rests at an angle so that gravity helps keep papers organized. Another version, with a single cutout, was used by blind workers as a reference point to recall if the previous sheets had been stacked toward, or away from, the cutout.



Paper holders eliminate problems with papers arranged on a table for collating. Sometimes papers are hard to reach, get jumbled, and take up a lot of space. These two versions of plywood paper holders help improve efficiency and organization. The stack holder on the left can be filled from the back. A sheltered workshop with which we worked developed a third version (not shown): its back was removable so work supervisors could resupply paper without delaying the worker. The holder below was constructed for a worker unable to raise his arms higher than the holder; the receding slots let the worker identify pages visually.



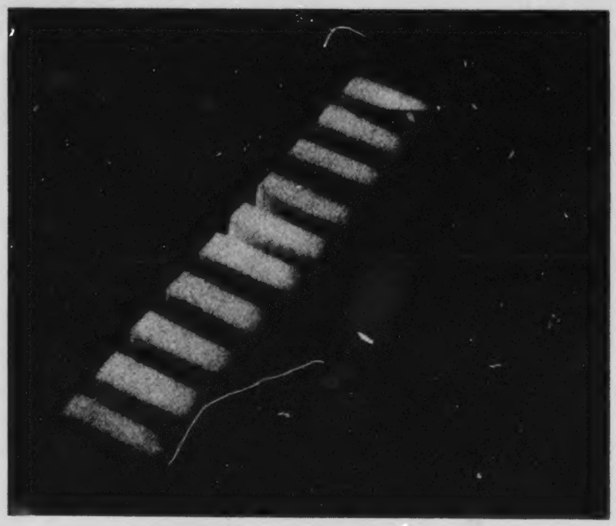




Sending items to the wrong cottages and lost clothing troubled mentally retarded workers at a residential institution who had difficulty recognizing, locating, and reading standard laundry marks.

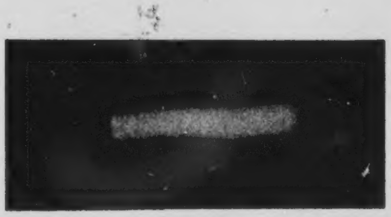
To resolve this, *laundry symbols* that could be easily recognized were selected (top), stamps with the symbols were purchased, symbols placed on the clothing (middle), and corresponding symbols placed above and on the laundry cart (bottom). Later, symbols were also placed at the cottages.

A training sequence was then used to train workers to stamp, recognize and sort clothing and linens according to the symbols.



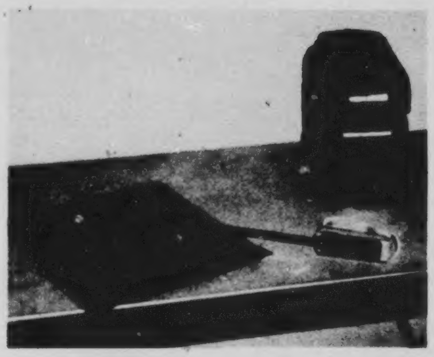
Pen and pencil holder: Persons with poor pinch grasp or hand incoordination often cannot easily pick up objects from a table. Inserting pens, pencils and other small tools and implements into this holder allows the hand to slide under the implement for easier grasping. The holder is made of foam packaging material and can be secured to the table with double-stick tape or with Dycem (friction material).

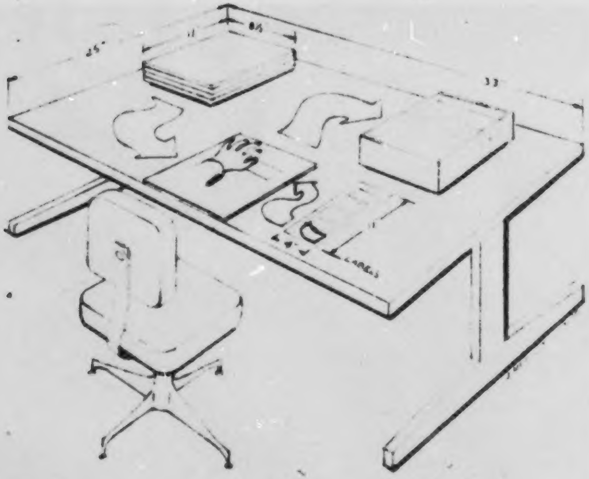
Aids for grasping:



Workers with weak grasp often can use pencils and other thin tools with some assistance. The pencil here was built up with packaging foam.

The handle of the letter opener (right) is inserted into a pouch, and the pouch attached to a Velcro strap that fits around the hand. On this model a rounded block of wood was added behind the pouch to fit it better in the palm of the worker's hand. Note that this worker is using an electric, rather than a manual, stapler.





PLACING SELF-ADHESIVE LABELS ON BOOKLET BY BLIND RETARDED PERSONS

For sheltered workers paid on a piece-rate, inefficient set-up of work tools and materials deprives them of potential earnings. This diagram is one illustration of an optimally efficient set-up for workers able to use both hands to label envelopes.

Some of these fixtures were described in the March 1978 issue of Response and fifteen workshops were subsequently provided with diagrams for constructing the fixtures.

Principles used to develop these production fixtures (or aids) were the basis for the training program the staff developed in conjunction with consultant Jay Belding, entitled "Increasing Productivity of Workers in Sheltered Industry." The program included methods used by competitive industry to promote efficiency (such as motion-time-measurement principles and production fixtures), application of this technology to sheltered industrial production, using fixtures and work-flow restructuring to complement a disabled worker's ability, other factors to enhance the performance by physically and developmentally disabled workers (e.g., positioning, training, teaching the value of money), demonstration and group problem-solving of current production problems, and locating professional consultants when needed by a facility. We later added to the program information on working with plastics and other materials.

This program was offered to 79 Regional participants on three occasions. Further details of these and other training programs are included in the final section on Dissemination.

PART II

PREVOCATIONAL

3. EVALUATION AND REALISTIC TRAINING

Problems

Prevocational concerns involve evaluating the vocational assets of a given individual and matching them with feasible vocational possibilities.

Region III Involvement: *33 clients*
17 facilities

Standard vocational evaluation systems often fail to take into account factors which may help physically impaired, developmentally disabled individuals perform their best. Even though two commercially available systems, VIEWS and MICRO-TOWER, are designed for the mentally retarded and the VALPAR system is designed to test functional capabilities, no system exists to test the abilities of severely disabled persons. Simply, no existing system considers possible adaptations or modifications to the work samples which may improve the disabled person's performance.

The result is that many vocational evaluation centers greatly restrict the work samples or job tryouts to which they expose severely disabled clients, or worse, simply refuse to evaluate them. Other evaluators are willing to try, but lack knowledge of what steps would enhance a client's performance during evaluation.

Initially, a literature review on vocational evaluation for severely disabled persons -- particularly among those with developmental disabilities -- was conducted. This was followed by meetings with vocational evaluators affiliated with local state vocational rehabilitation agencies and with comprehensive rehabilitation centers; the purposes of these meetings was to determine exactly how severely disabled persons were being evaluated and what were evaluators' needs in serving these clients.

The staff then began vocationally evaluating 33 severely disabled clients using the team's interdisciplinary approach. Our intent was to find ways to maximize an individual's functional capability during evaluation, at the same time as identifying skills or potential skill areas. Since it was beyond the scope of this project to develop an entirely new vocational evaluation system, we instead focused on expanding and modifying existing methods. Our interdisciplinary approach involved a rehabilitation counselor trained in vocational evaluation, an occupational therapist, a rehabilitation engineer, and an industrial designer (available to "mock up" changes during the evaluation process). The following is a brief description of aspects of evaluation addressed by our staff, but which were generally not included during standard vocational evaluations by DVR facilities.

Positioning/seating/stabilizing:

Difficulties in these areas cause fatigue, inability to fully use extremities, and inability to access the work areas. We emphasized setting work tasks up so as to maximize the evaluee's ability. Due to the highly individual nature of each person's disability, it is impossible to prescribe "standard" table heights or positioning of materials, etc. to enhance the individual's performances, so positioning/stabilizing and seating need to be determined on a case by case basis.

Home evaluations:

An evaluation of the home site, including home accessibility and the individual's independence in self-care, were conducted as part of our evaluation for two reasons. First, self-care independence and methods to make self-care efficient routinely impact on a person's readying oneself for work each day and managing one's needs at work. Complete independence by the client was not necessarily our objective -- adequate independence was. By this we meant functionally independent enough to work. In some cases it was more desirable for the individual to rely on assistance rather than to dress independently in the morning, so that the individual would be fresh for work. In other cases, methods to resolve potential toileting and eating difficulties on the job were investigated at home. Second, if it appeared as though worksite employment would be a hardship or even a distant goal, the staff would evaluate the home site to see if it provided an amenable situation for homebound employment.

Modifications/aids:

As with repositioning individuals or their work materials, it was often necessary to determine if "doing a task another way" or "using an aid" would substantially improve the individual's performance. This was an integral part of our evaluation process. We often tried other methods (i.e., using feet rather than hands to type) or employed devices or aids (i.e., using an electric letter opener) in assessing the individual's performance. Often we fabricated "mock ups" of devices to see if they would make an appreciable difference in the individual's performance.

Practice/training in work tasks:

In some cases, the individual was unable to perform the movements required for a task. In other cases, a learning disability prevented the individual from initially doing a task as best as he or she could. In response, the staff explored relaxation techniques, or encouraged the individual to practice/train him or herself for a few hours -- sometimes several months -- or used nonverbal training to criterion before evaluating his performance and concluding the individual either had, or lacked, the skill to do certain tasks. Our experiences confirmed that persistent individuals with cerebral palsy could often train their reluctant muscles to accomplish tasks they previously had been unable to do. We also observed that over time, after being placed on jobs, many persons relaxed themselves and developed improved motor control. By applying these observations to the evaluation process, we often assessed and then later reassessed an individual's skill at the same task.

Analyses of prospective jobs:

Because of the severely debilitating effects of the disabilities of some individuals with whom the staff worked, their job options were often narrowed considerably. Often it was necessary to analyze tasks of prospective jobs that the individual might be able to do. In such cases we then simulated at our office the critical cognitive and physical tasks and explored alternate ways or aids that might enable the person to do them.

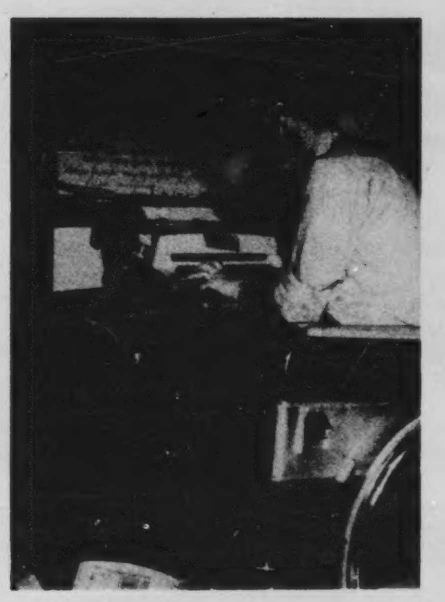
Pinpoint vocational difficulties and develop strategies for reducing them:

The hallmark of our approach was that evaluations resulted not only in a measure of current performance, but also provided our professional guidance on what strategies would be effective remedies -- in other words, the evaluations provided counselors with a prescriptive plan.

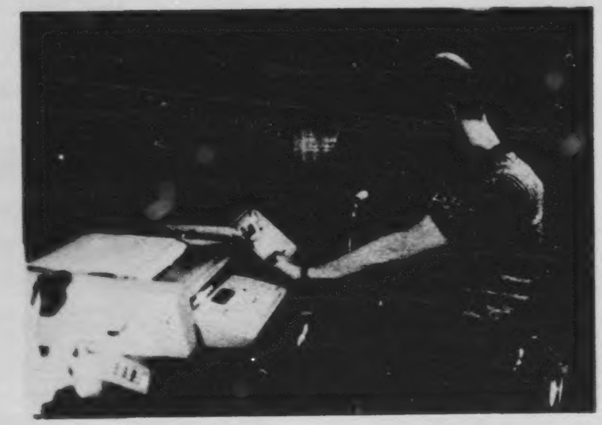
The following photographs document the unique problem-solving aspects of our vocational evaluation process. The case discussed involves athetoid cerebral palsy.

(1) While exploring ways to make his writing more legible, the staff observed this individual's effort to stabilize his hand by resting it against his knee when writing.

(2) Next, he was encouraged to apply this stabilizing effort in typing. Simply by securing his feet beneath him and stabilizing his dominant hand on his knee -- essentially by eliminating extraneous movement -- his typing speed doubled when compared to his speed sitting at a typing table.



(3) Next we explored ways to translate these findings to a work setting. To secure his lower extremities, he crossed his legs, then hooked the toe of one foot on the wheel of his chair. His upper torso was secured by placing his right arm, which he did not use to type, behind the right handle of his wheelchair. Finally, to stabilize his typing hand, he rested the upper arm across his chest and the forearm across his wheelchair armrest, leaving his fingers free for one-handed typing.



(4) Since typing was not fast enough for many positions, we explored his potential for computer programming by having him enter a training program. He used his stabilizing techniques while in training at his house, and later at his job on-site.

Since information compiled by vocational evaluators is ordinarily used by state vocational rehabilitation agency (DVR) counselors to determine an individual's rehabilitation potential, inability to fully evaluate the severely disabled person's job possibilities (a priority to DVR) runs the grave risk of excluding severely disabled persons with rehabilitation potential from rehabilitation services or needlessly causing them to enter jobs (including sheltered) far below their capabilities. (The fact that severely disabled persons are often routinely targeted by evaluators for sheltered employment, itself a poor job match for individuals with poor motor skills, is evidence of this tendency.)

To achieve job placement after evaluation with severely disabled persons, it is necessary to provide comprehensive, carefully orchestrated services. It was therefore frequently necessary for the staff to act as advocates on behalf of clients -- with their families, with vocational evaluators (in one case the intake and evaluation staff of a comprehensive rehabilitation center in the Region that was refusing services based on severity of disability), with training personnel, and with rehabilitation counselors.

We produced a 17 minute, 3/4 inch videotape entitled, "An Opportunity to Work: Job Development for Severely Disabled Cerebral Palsied Persons." Case histories of three persons were provided along with highlights of techniques used by the project staff to maximize their abilities and minimize their disabilities during evaluation and job placement (such as stabilizing the body and work materials, use of aids, and so forth). The videotape was described in the December 1977 issue of Response, and copies were made available for purchase or loan throughout the Region.

An explicit description of how to alter standard vocational evaluation procedures is described in one chapter of our upcoming book, Working with Cerebral Palsy (to be published).

Inasmuch as disability-specific job possibilities have been compiled by various consumer groups in pamphlets (for example, National Association of Retarded Citizens, Epilepsy Foundation of America, The President's Committee on Employment of the Handicapped), we instead focused on job possibilities of the most severely involved among developmentally disabled persons, those with cerebral palsy. Since job possibilities in such cases are so disability-specific and since disabilities are so highly individual, rather than describe a general listing of jobs (earlier we had proposed a job schema of possibilities listed by nature and type of disability), we concentrated on problem solving aspects of client-job matching. We compiled Working with Cerebral Palsy for consumers and their families as well as for rehabilitation practitioners. This book includes interviews with workers disabled by cerebral palsy, a chapter on how to alter standard vocational evaluation practices, a description of common work tasks and how they are able to be resolved with other methods or aids. When published, the book will be distributed throughout the Region.

Numerous training workshops, lectures and in-service programs on vocational evaluation conducted by the staff are described in the "Dissemination" section of this report.

4. NERVE COMPRESSION

Problem

A potentially serious and reversible medical problem to which the staff was equipped to respond is the effect of central nervous conditions on peripheral nerves. Wheelchair ambulatory persons and those spending long times in bed often end up having deformities and being unable to use parts of their bodies as the result of prolonged compression of the nerves. Nerve compression itself results from maintaining one position for too long.

Region III Involvement: *13 clients*
1 facility

The Job Development Laboratory staff worked with the medical staff of the Northern Virginia Training Center (NVTC) after a lengthy delay to obtain permission of their Human Rights Committee. Thirteen clients were selected and, using nonintrusive electrodiagnostic methods, were tested for abnormal nerve conduction. Abnormalities were found in three clients, indicating nerve compression. For two, elbow flotation cushions were provided to decrease nerve compression and prevent further nerve deterioration. These aids consist of a stockinette sleeve with a T-foam insert that protects the point of palsy.

Further testing at NVTC was pursued but could not be implemented before the end of the project.

A similar study was proposed to Forest Haven (an institute for District of Columbia residents), which declined because its priorities precluded such a study.

Many consumers and professionals are unaware of commercially available aids/devices that protect from nerve compression or do not know where to locate such aids. A single source is needed with information about devices designed to protect the body from deformity or dysfunction due to nerve compression as well as skin breakdown, falls, poor positioning in the wheelchair, excessive moving in bed, etc.

A Resource Guide to Protective Aids, to be published in December 1979, discusses the need for protective aids, lists and describes such aids, and lists manufacturers and suppliers. Illustrations of various types of aids are included. Findings will be presented at a large, Regional conference scheduled for March 1980 (see the section of this report on "Dissemination" for details).

PART IV

COMMUNICATION

5. COMMUNICATION

Problems

Communication disorders of multiply handicapped, developmentally disabled persons are among the most difficult to serve, so not surprisingly this was the most frequently expressed problem throughout Region III. The staff faced the problems of both grasping the natures of these disorders and developing intervention strategies. Communication difficulties range from articulation and speech deficits, language comprehension, reading and writing difficulties, lacking motor control to master manual communication (signing) or nonvocal communication, to related difficulties such as not knowing about alternative methods or devices, and where to get technical assistance for selecting or constructing communication devices. These problems stem from any one or a combination of the following: mental retardation, emotional problems, hearing loss, local or generalized brain dysfunction, or muscle impairment to the breathing or speech apparatus.

Region III Involvement: *27 clients*
7 facilities

The staff collaborated in some cases with facility personnel, in other cases directly with clients, and in still other cases served as a referral source. For example, the project staff assisted in designing and providing communication devices for infant language stimulation, developed devices (such as a communication board for verbal interaction in college), altered or fabricated control switches for individuals, and put individuals in touch with other service providers. Solutions for selected case histories are described briefly in this section.

Little effort has been made to address communication problems faced by developmentally disabled persons with multiple physical handicaps. Many times these people are considered too severely retarded or too young for nonvocal alternatives. Alternatives that have been painstakingly discovered by researchers are not widely known in the community. Compounding severe communication deficits is the fact that they inhibit all other types of learning necessary for normal development and distress an individual's life in many ways. For example, how can an infant with no speech and little reliable motor control learn expressive language? communicate with parents or playmates? learn to operate a device or use an alternative method?

The project staff collaborated with staffs of three facilities to develop an approach to early intervention and training in the use of electronic communication devices. Speech pathologists at the Northern Virginia Training Center (NVTC, VA), the Children's Program at Centers for the Handicapped (MD), and Central Fairfax Services (VA) actively collaborated with the project staff. This intervention is designed for nonvocal persons, including some profoundly retarded, whose physical involvement is so great an impairment to their communication skills that electronic devices appear to be the only means available to them. The approach is a training sequence that begins by identifying the most appropriate control switch for an individual, next teaching the person to express him or herself using a communication device, and then progressively using more sophisticated communication devices. In some cases biofeedback techniques have been employed to engage and sustain the individual's attention in pre-speech activities. Used with severely disabled persons, the training sequence has resulted in effective use of multi-selection electronic devices which can aid in: (a) more accurate assessments (i.e., educational, perceptual, intellectual and vocational); (b) specific classroom or therapy learning tasks; and (c) expression of specific thoughts and needs.

The need for control switches that could be managed by severely physically disabled infants and children surfaced when speech pathologists attempted to use environmental control and communication devices as part of their language stimulation programs. In a number of cases, mental retardation compounded the physical difficulties of language acquisition and expression of nonvocal infants, children, adolescents and, occasionally, adults.

With infants:

A speech pathologist at the Children's Program of Centers for the Handicapped, Inc. (MD) used a device designed and constructed by the project staff with two severely physically impaired children aged 3 and 4 to (a) stimulate picture recognition of an object (abstraction) in pre-speech activities, and (b) obtain a clearer understanding of one child's perceptual and intellectual deficits which were, in turn, critical in planning individual educational and communication programs.

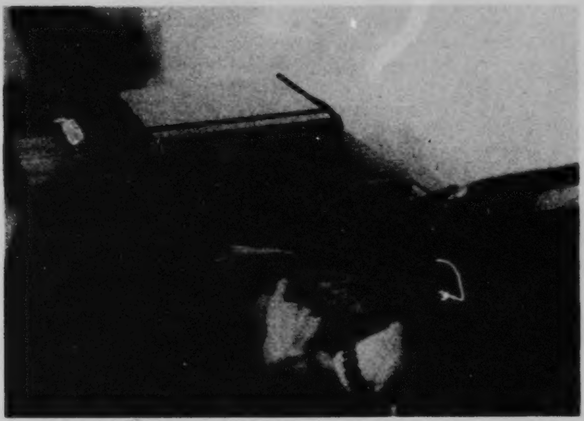
The box, pictured here, is equipped with a light bulb covered by a screen on the top side, so that when the screen is pressed the bulb lights up; pictures can be affixed to the screen.

Lighted Picture Box

The box is designed to provide an infant with a direct means of nonvocal communication, inasmuch as switches have been found to be too abstract. A report detailing the uses of this device, with suggestions for improving its design, is found in Appendix A.

With retarded, nonvocal children and adolescents:

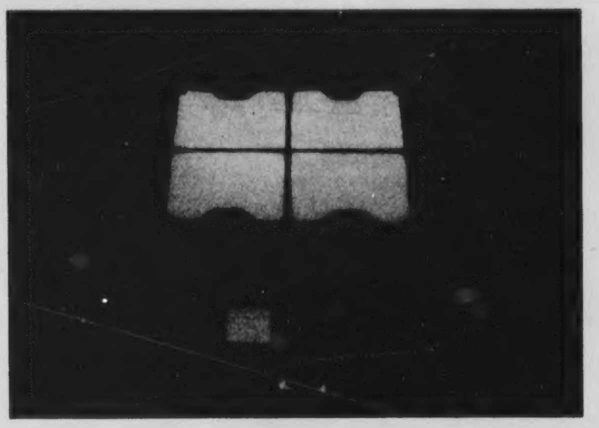
Speech pathologists at the Northern Virginia Training Center (NVTC) found that communication devices were effective in initiating expressive communication skills for eight nonvocal and severely involved retarded children aged 3 to 13. While the use of electronic devices and controls to stimulate expressive communication was explored, the children directly benefitted in terms of language development. For example, in an early effort to develop a control switch for the largest number of severely physically disabled children, the staff explored the use of an environmental control device with a pressure sensitive control switch. These are depicted in the illustration below.



Concerned that the user experienced difficulty with discrimination and perception led to trying the commercially available Message Selector, shown below on left.

The Message Selector, an eight-choice communication device, helped the NVTC staff pinpoint difficulties they faced in using it with their residents. These difficulties included: (1) the display area was too small for residents to clearly see attached pictures or signs; (2) the light indicator at one corner of the display area confused the children; (3) selection of a display area was indicated in too subtle a manner; and (4) the scanning mode of selection triggered increased spasticity in anticipation of having to press the selector within a specific given range of time. These problems were eliminated and substantial progress documented -- even with some residents labelled profoundly retarded -- by using a training sequence with gradually more sophisticated communication devices.

The Job Development Laboratory designed and provided NVTC with a two-choice device activated by remote control, very light pressure and a release switch (see device on left in the illustrated Message Selector on the previous page) and a subsequent four-choice device depicted below.



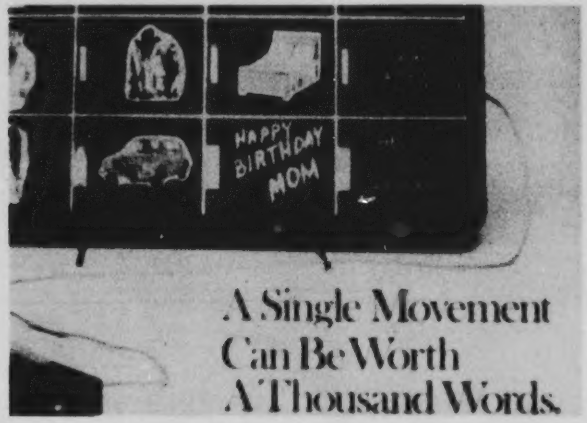
Interestingly, other applications for the communication devices were found, such as better assessment of the individual's perceptual and cognitive functioning, communication skills in classroom work, and to administer the Peabody Picture Inventory test to residents who had difficulty or fatigued while pointing to the correct answer (which in turn adversely affected their scores).

With nonoral, retarded adolescents:

Appendix B describes in detail the progress among three severely involved children and adolescents, each labelled retarded, in acquiring expressive communication, electronic devices and controls. All greatly expanded their ability to express and initiate communication, some even learning to express complete statements. Previously, two had been able to communicate only by responding to Yes/No questions, and the speech of the third, while used, had been virtually imcomprehensible. In one case, intervention led the NVTC staff to question the diagnosis of retardation and provided a means to better evaluate him.

With nonoral adults:

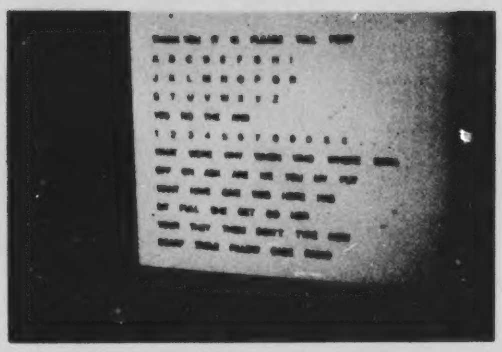
The Activity Center staff of Central Fairfax Services (CFS, Virginia) and the project staff collaborated to enable a twenty-one year old client to communicate with the sixteen-choice commercially-available Zygo Communicator, illustrated below.



This individual, with severe extensor thrust and rigidity as the result of cerebral palsy and a fused hip necessitating a supine position, had previously been able to communicate only by eye motions and arm raising and lowering in response to Yes/No questions. She had been unable to reliably point on a communication board, and it was not until practicing with the eight-choice Message Selector (see illustration, page 33). that she expressed her first spontaneous thought. Success with the eight-choice communication device convinced the family to purchase the sixteen-choice electronic Zygo Communicator. Because of this individual's limited movement, experimentation by staff of Central Fairfax Services was necessary to select the appropriate switch and position it properly, and to set up the board for maximum use. At the request of the project staff, a representative of the Zygo Corporation visited the client at CFS to assist in this and to further explain the use of the board. The client is now using the board to spontaneously signal for assistance and to express some of her needs. It is set up all day at her work station where instructors work with her to increase her skill. She is able to operate a switch selected to match her level of control, using her more functional arm in a bent-elbow position. Better positioning also has enabled one of the CFS staff to work with the client in prevocational activities such as drawing and puzzles. The CFS staff were also informed by the project staff of the language development training program developed by Zygo for nonvocal persons with mental retardation. This program uses the sixteen-choice board. The CFS staff expressed great interest in pursuing this program.

On other occasions, the project staff worked directly with developmentally disabled adults who sought assistance with communication devices.

For one person, a mobile communication board was determined to be necessary for her to independently attend community college classes, a step in her job skill training and eventual vocational rehabilitation. The staff first used words printed on magnetape and a steel base with which to experiment and determine the best "word content" configuration for her board, as seen in this photograph.



Ultimately, a flip-card arrangement, with different cards for communicating in various classes or social situations, served her best.

In another instance, a light pointer attached to eyeglasses was developed for an adult with slurred speech and very poor hand control, as seen in this illustration.

THANK YOU
PLEASE
WANT
HAVE
GIVE
WAS
HERE
HAS
SIT
PULL
SHE
GET
DO
HER
YOUR
THEY
THEM
DON'T
TYPE
HOW
SCARF
TABLE
PILLOW
CASE
RADIO

Both professionals and nonprofessionals require assistance working with multiply physically handicapped persons manifesting communication disorders. Even trained speech and language therapists report that they often rely on intuition and chance in treating such youngsters or adults. Many say that they lack training in how to serve this group (e.g., using neurodevelopmental approach with adults is contraindicated) and in communication aids or alternatives. A serious and often heard complaint throughout the Region is lack of money to hire or use a trained language pathologist, and in rural sections there appears to be a virtual absence of such professionals. Parents and others who are untrained in speech and language therapy, but who regularly serve these children or adults in schools, activity centers and institutions, ardently seek ways to enhance the persons' speech and language prognosis, particularly so that he or she is not consequently "developmentally delayed." Vocational evaluators and rehabilitation counselors similarly seek ways to vocationally assess and access the brain of persons who are very physically impaired.

Speech and language pathologists experienced in treating severe and multiply handicapped, developmentally disabled persons joined the project staff to determine the type of information needed and the most effective way of providing it throughout Region III. Collaboration by these pathologists, who represented ten facilities, resulted in the publication of two resource books. The first was Communication Resources for the Developmentally Disabled: A Guide for Parents, Paraprofessionals and Professionals. This is a collection of resource materials, including a list of commercially-available communication devices, meant for all who want to know what is available to aid speech and language development of developmentally disabled persons. The text separates resources appropriate for the professional from those for the lay person, for easy accessibility. Resources are grouped into chapters on screening and assessment instruments, therapy resources, communication alternatives and devices, sourcebooks, and services. A one page description of each resource is provided, along with the publisher or manufacturer, price information and evaluative comments by the collaborators.

The second book is Cerebral Palsy and Communication: What Parents Can Do. The text is designed solely for the lay person who wants practical guidelines on "what to do" when faced with various communication problems presented by cerebral palsied persons. Although designed specifically for the nonprofessional, many professionals have found it extremely valuable, and several universities have used it as a text in various courses. Topics that are discussed include the nature of cerebral palsy, difference between speech and language, a developmental milestone, positioning for speech, feeding and oral-motor control, the individual who also has a hearing impairment, breathing and speech, and nonvocal alternatives to speech. Forty-five line drawings illustrate the text.

When first published, both books were announced in the newsletter, Response, and free copies were mailed to persons throughout the Region. They have since been available upon request. Evaluations of both of these books and a description of training programs are included in a later section of this report, "Dissemination."

The virtual absence of training in nonvocal communication alternatives in graduate programs for speech and language pathologists is a roadblock to effectively serving these individuals. The need for such training was emphasized both by the professionals who collaborated on the books and by others with whom the staff came into contact.

At the behest of the project's Advisory Board, the staff (1) advocated curriculum changes to include graduate training for speech and language pathologists in nonvocal methods and aids, and (2) sought to contact professional language pathologists now working with developmentally disabled persons to acquaint them with the books and other resources.

The project staff contacted the National Office of the American Speech-Hearing-Language Association (ASLHA) and presidents of the six state chapters within Region III. Complimentary copies of both communication books published by the project staff were warmly received. This series of communications led to endorsement by the National Office's committees on "Research and Professional Development" and "Communication Processes and Nonspeaking Persons;" to a commitment to promote our concern and our communication resource books at the June 1980 World Conference of Rehabilitation International; to an announcement describing our books in the Maryland ASLHA newsletter Intercom; and to direct assistance of a California resident losing his speech due to amyotropic lateral sclerosis and his pathologist, who were seeking nonvocal alternatives.

Both communication books were announced and described in Communications Outlook, a quarterly newsletter addressed to individuals interested in applying technology to needs of people who experience communication handicaps due to neurological or neuromuscular conditions.

Consumers, their parents, and service providers report that the objective selection of an appropriate communication device is nearly impossible due to lack of common knowledge of the wide array of devices commercially available and their relative merits, lack of a central "housing" facility for a wide selection of aids for an individual to explore and select, and lack of locally available technical experts to fabricate or customize communication devices.

Because our services were only temporarily available and we were not funded to provide assistance to the many who needed it, the project staff sought to locate technical experts besides ourselves -- and to acquaint consumers in Region III with these experts.

Two primary (1, 2) and one secondary (3) resources were located for individuals who seriously want help selecting the appropriate communication device. One source (4) available locally to provide technical modifications or similar assistance was found; and an excellent centralized source (5) of information was identified. The following describes these resources respectively.

(1) The Communications Aids and Systems Clinic (CAS), S120 Waisman Center, 1500 Highland Avenue, Madison, Wisconsin 53706 (608/263-2522), which opened in early 1979, houses nearly all commercially-available devices. As a multi-disciplinary team that includes an occupational therapist, engineer, and speech and language pathologists, they offer a three to five day on-site evaluation service. The service includes fabricating or customizing communication aids if that is necessary.

(2) The Children's Hospital at Stanford, 520 Willow Road, Palo Alto, California 94304 (415/327-4800) provides similar

services in the Rehabilitation Engineering Department, but limits their services primarily to individuals under age 21.

(3) Although geared to provide, customize and service their own line of products, POSSUM, Inc., East-Coast Division, P.O. Box 451, Midwood Station, Brooklyn, New York 11230 (212/859-8850) is a London based company very experienced in serving communicatively impaired persons. They have East and West Coast offices, but presently are unable to serve the central United States. They provide evaluation at the home of the individual by a team consisting of an occupational therapist and an engineer. Their line of devices includes various communication aids and interfaces, environmental control devices, and a teaching system for persons with reading or perceptual difficulties.

(4) Persons requiring customized equipment can often use local resources. Besides consulting with local university engineering programs, local service chapters of engineering societies, and high school "shop" programs to get technical assistance, they can call on Telephone Pioneers, a group that has the expertise to modify, customize and, in some cases, fabricate devices. The group consists of engineers and technical workers who offer their skills as a public service. Information about the closest local chapter may be obtained from Telephone Pioneers of America, 608 13th Street, N.W., Washington, D.C. (202/392-8225).

(5) An excellent source of information on aids and techniques for those who are communicatively impaired is Communication Outlook. This quarterly newsletter is fully informative and includes a column to answer questions of persons with specific problems. A subscription costs $10.00 per year. For further information, contact Communication Outlook, Artificial Language Laboratory, Computer Science Department, Michigan State University, East Lansing, Michigan 48824.

Information about these as well as other services (for example, about the Zygo system of communicators and the newsletter Communication Outlook) have been included in various issues of the project's quarterly newsletter, Response; it has also been made available through training programs and in response to individual inquiries.

6. HEAD PROTECTION

Problems

Head and facial injury due to seizures or self-abuse may be seriously debilitating, with injury ranging from lacerations, fractures and concussions to cognitive impairment due to brain damage. One notable theory attributes the positive correspondence between mental retardation and epilepsy to resulting head injury rather than by excessive electrical activity within the brain at the time of seizures. The unexpected nature of seizure activity further [illegible] an individual's choice of social and vocational activities [illegible] he or she feels able to safely participate. For example, [illegible] prone individuals often avoid taking public transportation, [illegible] otherwise clearly able, for fear of unexpected seizures [illegible]

The most commonly used type of institutional head protection is the sports helmet, which is largely impractical as it is intended for relatively short-term use. Other models have been designed expressly for institutional use, but most fall far short of the needs for full head and face shielding, light weight, snug fit with various head sizes, and good ventilation, visibility and washability.

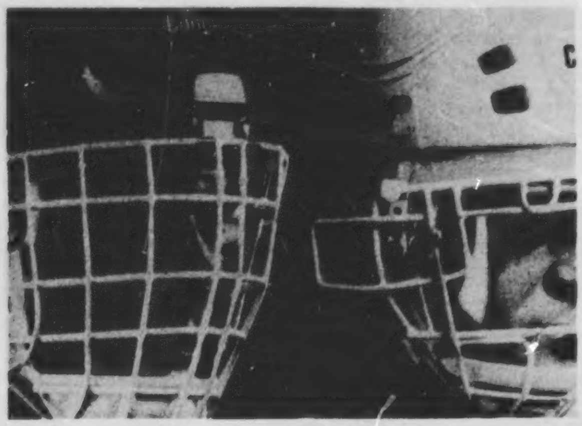
In a non-institutional environment, the problem of adequate head protection from uncontrolled seizures is compounded by the necessity for a cosmetically acceptable form of protection. No commercially available products afford adequate protection in a type of headgear which can be commonly worn in public, i.e., a hat, wig or cap.

Region III Involvement: *8 clients*
3 facilities

Head protection for institutional use:

A prototype that met the criteria for institutional use was designed and fabricated by the project staff, and was in the process of being evaluated by five patients of the Northern Virginia Training Center (NVTC, Virginia) when the staff learned of the newly marketed helmet by Cooper, Ltd., shown on the following page.

Arrangements were made with NVTC (VA) and the National Children's Center (DC) for testing of the Cooper SK-600 helmet with face mask with residents who had been using football, baseball, motorcycle and other sports-type helmets. Their experience proved the utility and durability of this model over other commercial alternatives. The Cooper helmet is completely adjustable and equipped with a large chin cup and a hinged and detachable faceguard; it is available through local sporting goods dealers carrying Cooper hockey equipment. The helmets are now in general use at the Northern Virginia Training Center.



Cooper hockey helmets

Experiences of those evaluating the Cooper helmet have been related to other facilities throughout the Region through articles in the September and December 1977 issue of our newsletter, Response and in our book, A Resource Guide to Habilitative Techniques and Aids for Cerebral Palsied Persons of All Ages, as well as through numerous training programs.

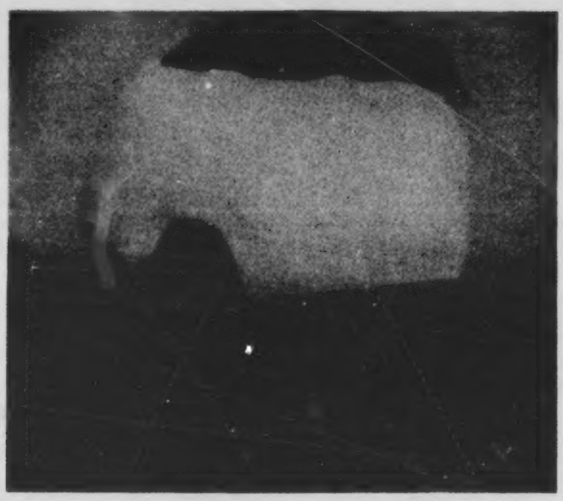
Cooper, Ltd., manufacturer of the helmet, has been advised of this use of its product. The cooperation of this company has been vital in obtaining technical assistance, modifications and replacement components.

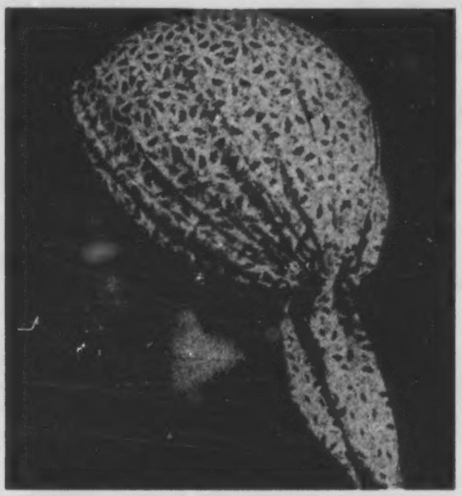
Concealable head protection:

Research into new materials to develop inconspicuous head protection revealed that Temper-Foam, a NASA-developed material, and Pelite, a foam used in prosthesic socket liners, worked well together. They can provide protection similar to sports-type equipment with one tenth the weight and less than half the thickness. A cap of two layers of Pelite with Temper-Foam sections sandwiched between can be vacuum-formed over a cast of the client's head, making a close fitting, realistically shaped helmet which can be concealed under a hat, wig, turban or cap. The helmet is illustrated on the following page.

After testing with three clients referred to our Laboratory, information concerning the concealable helmet concept was disseminated through the Epilepsy Foundation's newsletter, National Spokesman, and through the December 1977 and March 1979 issues of Response. Impressive feedback and requests for further information encouraged the staff to pursue the idea further.

The helmet was compared with others for concussion protection at the National Bureau of Standards and found to be as good or better than sports-type helmets. The forming process was further simplified and simple curved pads, which could be formed without a plaster head cast, were designed.





Concealable head protection

The final results have been disseminated through Physical Therapy Journal, Response, Epilepsy International Newsletter, and in a paper presented at the Interagency Conference on Rehabilitation Engineering. A copy of the paper presented at that Conference is found in Appendix C.

Suppliers of materials have been informed of the Laboratory's results and are being encouraged to provide samples to interested researchers.

7. UNCONTROLLED DROOLING

Problems

In some cerebral palsied persons and others, a problem with uncontrolled drooling and/or excessive saliva production is seen. This can result in odor, lack of social acceptance, difficulty in keeping work dry while working at a table or desk, wet and soiled clothing.

Traditional attempts at drooling control (reminding, conditioning, oral stimulation with ice or vibrator) is generally unsuccessful. A new method is very desirable.

Furthermore, information on drooling control is not widely available.

Region III Involvement: 3 clients
2 facilities

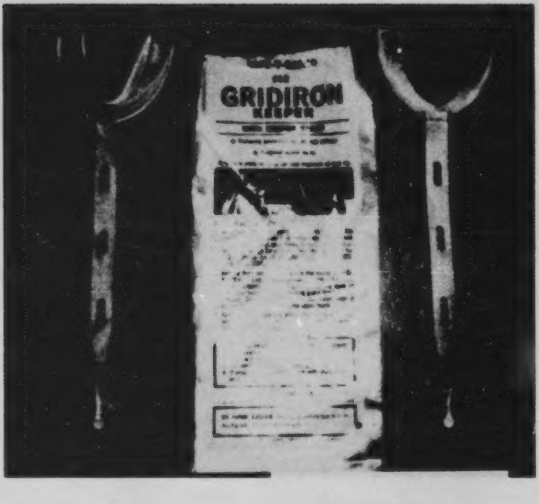
The project staff identified a drooling control device designed and tested at the Cerebral Palsy Research Foundation of Kansas, Inc. This device is made by a dental laboratory under the direction of a dentist, orthodontist or dental technician. It is plastic and fits in the mouth around the teeth to create a "dam." This causes a well of saliva which triggers a hyposensitive swallowing reflex. Although designed for drooling control, the device had never been tested or used with persons who were also mentally retarded.

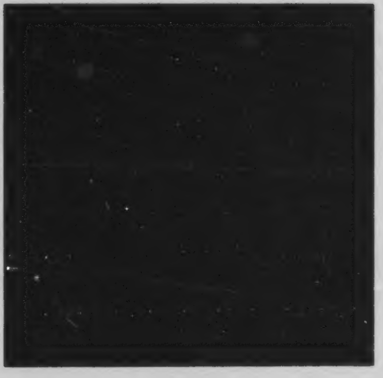
The information was passed on to an orthodontist who fabricated the device for a twelve-year-old patient. Use over several months resulted in greatly improved swallowing, development of neck muscles, better head position, lowered hard palate, better lip closure, decreased drooling when the device was not in place, and saliva control when it was in place. The client was much less frustrated with his work because he could keep work materials dry. Wet, odorous clothing was no longer a problem.

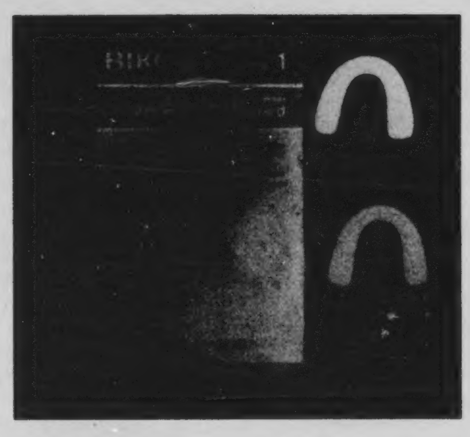
The staff worked with a residential facility for mentally retarded persons in organizing a drooling control program of treatment among residents. This program was not yet in progress at the time the project ended.

The staff explored adaptation of athletic mouthguards as drooling control devices. The dentist at the residential facility was interested in pursuing this. Photographs of available athletic mouthguard samples are shown on the following page.

Athletic mouthguards







Addressing the problem of the relative inavailability of information on drooling control, the staff contacted facilities doing research on drooling control biofeedback systems -- Ontario Crippled Children's and Moss Rehabilitation Center.

The drooling control device mentioned above was described in the September '78 issue of our quarterly newsletter, Response.

8. POOR HEAD CONTROL

Problems

Lack of head control, poor head control, or head held off center are seen in some developmentally disabled persons. In cerebral palsied persons, this is often caused by neuro-sensory deficits. Poor head control can result in poor social interaction, inability to see and use hands bilaterally in the body's midline, poor balance and body orientation, poor posture and positioning, difficulty with swallowing and oral communication, drooling, difficulty with eating, and difficulty performing work tasks.

Biofeedback techniques for head control have been studied but need further testing to determine effectiveness, particularly with persons with mental retardation.

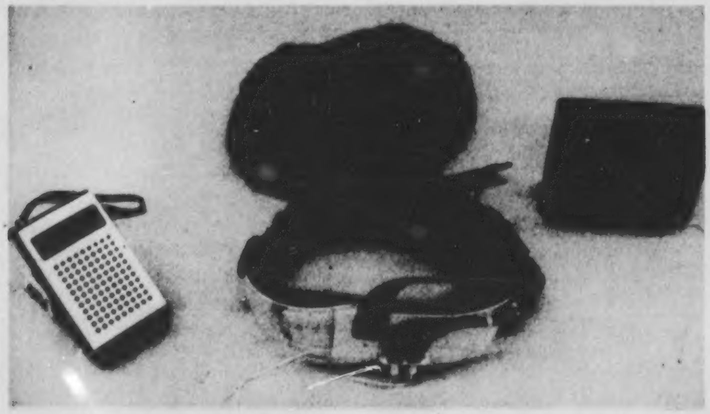
Biofeedback units which are available are heavy and expensive, and need the capacity to attach more types of feedback mechanism.

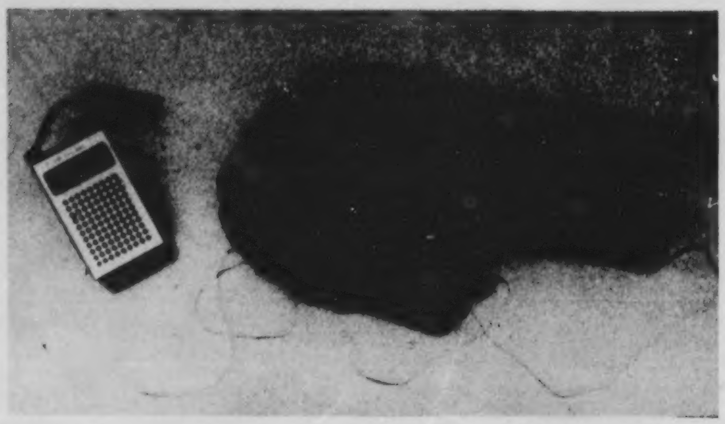
Finally, information on head control biofeedback is not widely disseminated.

Region III Involvement: 3 clients
1 facility

The project staff identified research facilities which were exploring biofeedback for head control (Children's Hospital, Moss Rehabilitation Institute, Ontario Crippled Children's Association) and contacted them for information exchange.

An electrical engineer was employed to devise a lightweight, inexpensive head control biofeedback unit with attachments for timing, event counting of target behavior, auditory and visual reinforcers, and the capacity to interface with additional devices. This allowed tailoring of the biofeedback program to the individual. The device is shown below.





Job Development Laboratory's
biofeedback device for head control

The prototype biofeedback unit that had been developed was tested at a residential facility for mentally retarded persons (Northern Virginia Training Center). As of the end of this project, three residents at the facility had used the device with the following results: Resident #1 achieved good head position with the device, but this increased abnormal muscle tone so its use was discontinued; Resident #2 would not keep the device on his head; Resident #3 trials are not complete.

To help disseminate information on biofeedback for head control, a Head Position Trainer of a similar configuration to the one constructed by the project staff (available from Adaptive Therapeutic Systems) was described in our manual, A Resource Guide to Habilitative Techniques and Aids for Cerebral Palsied Persons of All Ages.

Head positioning and biofeedback was discussed at parent workshops and in lectures.

9. POOR SEATING, POSITIONING AND STABILIZING

Problems

Poor seating, positioning and stabilizing can result from physical deformity, unbalanced muscle tone, lack of muscle tone, poor balance, lack of strength, and improper seating supports. In turn, it can cause medical complications, physical deformity, poor social interaction, inability to see and use hands bilaterally in the body's midline, poor balance and orientation, increased abnormal reflexes and muscle tone, poor posture, difficulty with communicating, eating and working.

Numerous clients referred to the project had seating and positioning problems.

Region III Involvement: 21 clients
5 facilities

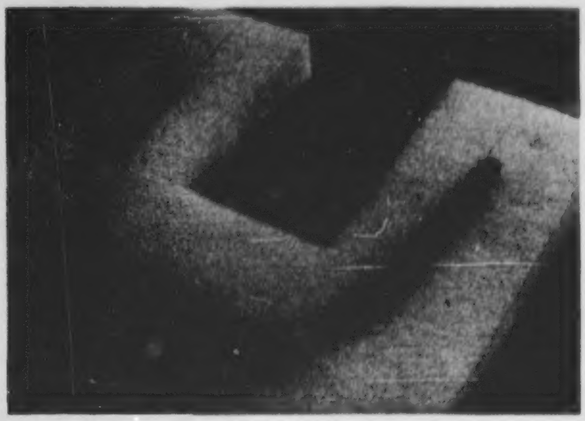
The project staff identified available customized seating techniques. Liquid foam customized seats were fabricated for several clients and a foam-padded plywood seat insert was fabricated for two clients. The staff identified and recommended functional positioning for three clients with cerebral palsy who were placed in competitive jobs. The staff also recommended commercially available lap boards, and devised custom lapboards where needed, for individual clients using wheelchairs, and where tables did not provide adequate positioning, different sized wheelchairs and firm seat inserts were recommended for several clients.

Current methods of constructing custom seating are costly and time-consuming. There is a need for an inexpensive, easy-to-construct method of custom seating or positioning supports, especially for the growing child who may need regular changes.

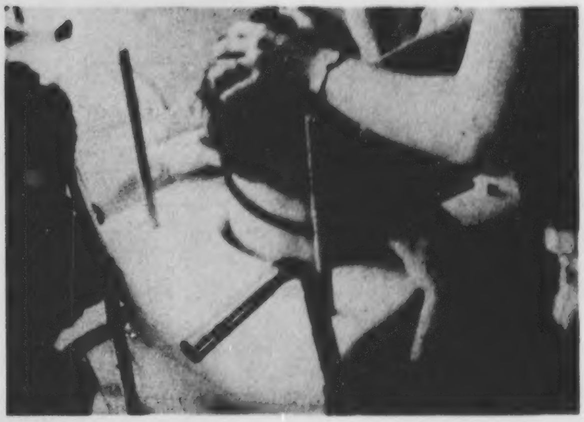
A method was devised to use two-inch Ethafoam sections, cut to fit the contours of the body, and stacked to make a seat insert. This is an inexpensive (about $20.00 per chair), relatively easy method to customize seating, which can be used by rehabilitation therapists. The technique was used at Great Oaks and Holly Center and demonstrated at several inservice training programs.

The photographs on the following page illustrate the method used in constructing these customized seats.

Job Development Laboratory's method for constructing custom seating:



The first two photographs on this page illustrate the first step in making a contour seat.



A flexible drawing curve is used to cut a section of the Ethafoam seat to correspond to the body.

The photograph to the left shows a final custom seat made for a client with scoliosis.

Since the closed cell material is not absorbant, a covering is not necessary. However, some people cover the Ethafoam with terry cloth for comfort.

Information about proper seating/positioning is available but not widely known. Also, stabilizing a person's upper extremities and work materials are techniques often overlooked which can greatly increase function.

Rationale, techniques and equipment for seating, positioning and stabilizing were discussed in numerous lectures, workshops and inservice training programs.

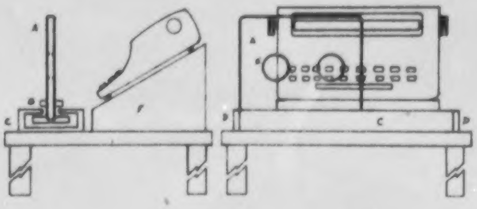
A chapter in our manual, A Resource Guide to Habilitative Techniques and Aids for Cerebral Palsied Persons of All Ages, describes rationale, techniques, equipment and resource materials on seating, positioning and stabilizing.

Commercially available adjustable-height tables and chairs were identified and information was supplied to workshop participants, lecture audiences and individual inquirers.

A chapter on "Positioning for Speech" was included in our book, Cerebral Palsy and Communication: What Parents Can Do; the book has been widely disseminated.

Through the project, a slide-tape program entitled, "Positioning and Adaptive Equipment for Children with Central Nervous System Deficits," was purchased from the Blythedale Children's Hospital. The program discusses easily constructed adaptive equipment for developmental positioning and stabilizing problems. It was used in training programs, announced in our quarterly newsletter, Response, and loaned free of charge to twelve Regional facilities upon request.

One Regional facility developed a device to stabilize the hands of someone with uncontrolled hand motions, to permit him to enter training or work situations requiring use of a keyboard. Shown in the photograph below, the illustration and following description of this device were included in our quarterly newsletter, Response.



A. 3/8" clear Plexiglas acrylic arm support. Shaped into ⊥ at bottom to fit into channel. Slides horizontally 4" to each side. Edged with metal for rigidity.
B. Strips of 1" plastic glued to each side of support for extra strength.
C. Metal channel attached to table. Lubricated with dry silicone spray.
D. Stop at each end of channel.
E. Arm holes cut to fit wrists. Lined with foam. Foam covered with velour which is riveted to plastic support.
F. Slanted support to tilt typewriter, computer keyboard or other keyboard for maximum visibility.

Excerpt from Response No. 7, March '79

FIXTURE FOR USE WITH TYPEWRITER OR OTHER KEYBOARD

Mark Stephenson of Occupational Services, Inc., in Chambersburg, PA, described this fixture employed by cerebral palsied clients for arm support when using a keyboard. These clients used a pencil in each hand, held on with elastic straps, to hit the keys. The keys were shielded with a key guard.

The clear plastic support slides horizontally and the user's arms move in and out of the holes to reach an area 4" x 12". Individual tailoring insures correct table, chair and armhole heights to maximize support and minimize fatigue. The tilt of the keyboard can be changed for maximum visibility for each person.

10. HAND PROTECTION FROM SELF-ABUSIVE BEHAVIOR

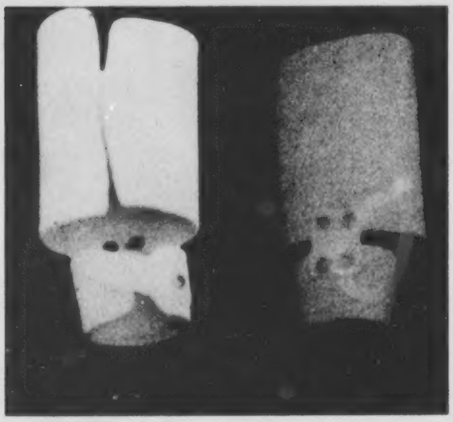
Problems

Hand biting was a frequently reported problem among clients of Region III facilities. It is commonly prevented by tying the hands of the individual behind his or her back or immobilizing the elbows, thereby severely restricting use of the hands in self-care, feeding, toileting and other developmental experiences involving use of the hands. Beyond recommending that behavioral methods and counseling intervention be explored in such cases, an optimal solution would free the hands for use and provide nontoxic hand protection should the individual try to bite the aid.

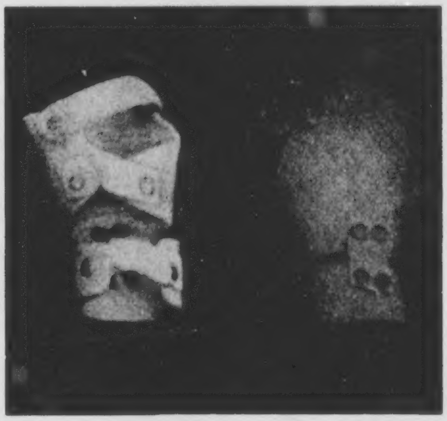
Region III Involvement: 6 clients
4 facilities

Six self-abusive clients were referred to the Job Development Laboratory staff, who in turn worked with both the clients and the staff members of their respective institutions to devise workable solutions for these cases. During this process commercially-available and current methods for handling these situations were explored. Facilities involved in developing and refining solutions included Forest Haven (DC), Great Oaks (MD), Holly Center (MD), and the Clary Street Learning Center (WV).

Two types of hand guards, called "Protective Mittens," were developed to avert injury to the wrist and hands due to biting without inhibiting the use of the hands. One design (below left) completely covers the hand and wrists and is used when the wearer is unsupervised. The second design (below right) is for use during feeding and other supervised activities and allows greater finger movement. As shown, the wrist and hand segments are hinged to allow free movement without exposing the skin to injury.



Full hand protection



Partial hand protection

Self-feeding with
"Protective Hand
Mittens"

The procedure for constructing the Protective Mittens was demonstrated to approximately 40 rehabilitation professionals during two on-site training programs. For details, see the section of this report on "Dissemination."

The Protective Mittens were described and pictured in the December '77 issue of our quarterly newsletter, Response, which was mailed to approximately 500 facilities and individuals throughout the country. As a result, 18 inquiries from Region III facilities were received concerning the Protective Mittens, and all were supplied with simplified instructions and accompanying diagrams to enable them to replicate the Mittens for their clients. Follow-up inquiries confirmed that both the instructions and the Mittens themselves have been very useful.

A description of the Protective Mittens along with a diagram was included in our manual, A Resource Guide to Habilitative Techniques and Aids for Cerebral Palsied Persons of All Ages, and is included as Appendix D of this report.

11. DIFFICULTY WITH MOBILITY, AMBULATION, TRANSFERS

Problems

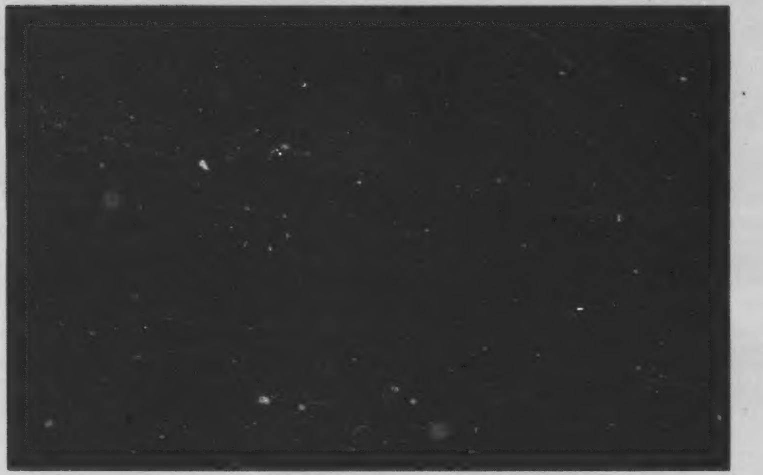
Many persons with cerebral palsy and other developmental disabilities have difficulties with mobility, ambulation and transfers. These problems can be caused by spasticity, muscle imbalance, athetoid movements, physical deformity, abnormal reflexes, lack of muscle tone, lack of mobility training (e.g., for traveling). Difficulties can affect walking, use of a wheelchair, ability to transfer to and from chair, bed, bathroom, etc. They can also result in limited social and vocational opportunities, decreased independence at home and on the job, and difficulty in self-care, hygiene and toileting.

Numerous clients referred to this project had difficulties with mobility, ambulation or transfers.

Region III Involvement: 17 clients
3 facilities

In consultation with individual clients, the project staff: recommended techniques to help stabilize a client with athetoid cerebral palsy when walking; recommended a stair-climbing seat to allow a client with athetoid cerebral palsy to access basement work room for homebound employment; provided training in the use of subway escalators to a client with cerebral palsy; and did analyses of bathrooms of several employment and home sites to discuss changes which would permit clients to transfer independently.

Under the project a lightweight, plastic "over-the-wheel" transfer board was designed and fabricated. Shown below and on the following page, the board permits transfers in and out of a wheelchair without hitting the wheel of the chair. The staff arranged for production of the board with Fred Sammons, Inc. (Box 32, Brookfield, IL 60573), a manufacturer and distributor of therapeutic and adaptive equipment.



Over-the-Wheel Transfer Board

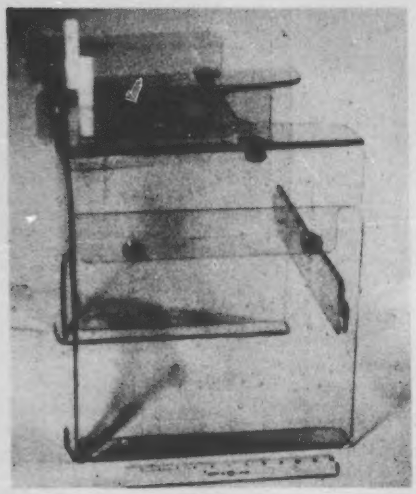
Information on this "Over-the-Wheel Transfer Board" was printed in our quarterly newsletter, Response, and discussed in numerous training programs.

Pre-school-aged children with low muscle tone needed a walker with stability which would not impede on the visual field, was adjustable and allowed the therapist and teacher to correctly position the child and see the child's body during use.

The staff designed and fabricated a positioning walker for use in kneel-walking and upright ambulation by pre-school-aged cerebral palsied children with low muscle tone.

The kneel-walker is clear plastic; it is adjustable in height, handle position and position of the elbow supports.

Photographs on the following page illustrate the walker and its component parts.



Job Development Laboratory's
Kneel-Walker

The Kneel-Walker was readily accepted by children and used successfully in an ambulation program by several children.

The staff contacted Adaptive Therapeutic Systems, a manufacturer of therapeutic equipment, to discuss production and marketing of the positioning walker. The staff also worked with the physical therapist who originally requested the walker in making other therapists aware of it, and arranged with a plastics fabricator to manufacture the walker on a request basis.

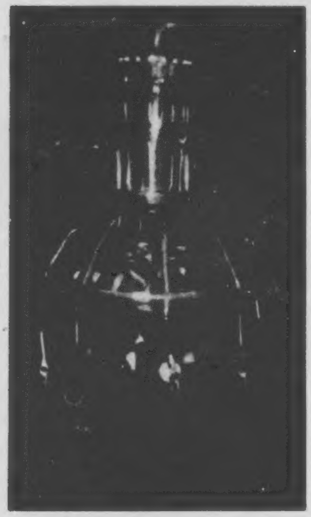
12. THE "CARLO PRINCIPAL" THERAPEUTIC TOY

Problem

A Baltimore inventor of a patented* therapeutic toy/technique called the "Carlo Principal" visited the Job Development Laboratory late in the project to obtain a medical evaluation of, and greater visibility for, his invention. The toy works on a spring-tension principal and is designed to encourage muscle development during play activities by infants and children disabled by cerebral palsy. The toy was the result of the devoted effort of Mr. Lee, the inventor, to expand the time his disabled child was involved in, and help his child enjoy, therapeutic exercises being done in the hospital.

Region III Involvement: *1 parent of a consumer*
2 facilities contacted

The Job Development Laboratory staff offered to duplicate the toy for a facility evaluating it, but since we were without patients or staff to evaluate the toy ourselves, we referred Mr. Lee to facilities likely to be interested.



The staff contacted the University Associated Facility at Georgetown University Hospital and arranged for Mr. Lee to meet with their staff. Although they lacked a sufficient volume of patients to evaluate the toy, they did write a supportive letter suggesting the type of child who might best benefit from the toy's use. Mr. Lee subsequently demonstrated the device to therapists and child development specialists at the John F. Kennedy Institute (MD) who wrote a supportive letter, although they too lacked a sufficient volume of infants on which to assess the invention. A subsequent phone call from Mr. Lee informed us that Mount Washington Hospital (MD) was considering researching his device in October 1979. The Job Development Laboratory staff wrote a supportive letter and repeated the offer to duplicate the toy.

The staff also suggested that Mr. Lee contact Children's Hospital (Baltimore), Kernans Hospital (Baltimore), Blythedale Children's Hospital (NY), and Ontario Crippled Children's Hospital (Canada).

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* U.S. Patent No. 4,147,344, April 1979

PART VI

ACTIVITIES OF DAILY LIVING

13. SELF-CARE IN DRESS AND GROOMING

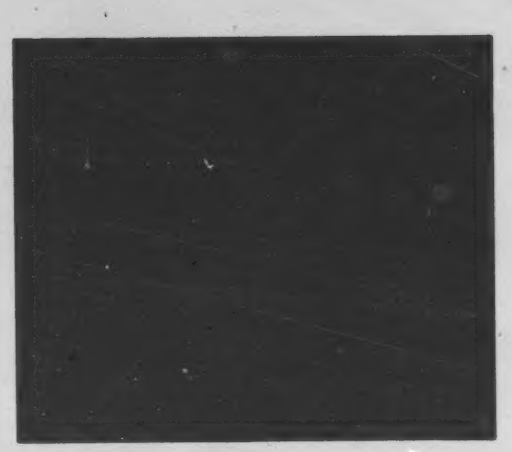
Problems

Among developmentally disabled persons, lack of self-care skills can result from poor motor control, poor coordination, or lack of training. Poorly coordinated upper limbs not only limit the ability to perform self-care skills, but also reduce the accuracy and speed with which tasks are performed, making someone too fatigued after morning dressing for work. In other cases a person may require assistance such as buttoning one's coat or managing a zipper at work, making the individual unnecessarily dependent on family or co-workers for activities which could be performed without assistance. This can result in needless dependency, waste of time for client, family and staff, needless expenditure of energy, and lowered self-esteem for the client. Numerous clients referred to the project had difficulties in this area.

Region III Involvement: *11 clients*
3 facilities

Adaptive techniques and aids were devised for individual clients. Some examples of aids include the following:

Long-handled comb



Sock aid
(made from Rolyan plastic
material)

Velcro pant closures

Button hooks

Information on aids and techniques is available but not widely known. Time-saving techniques, stabilization and alternate methods, as well as adaptive aids are available to help minimize dressing and grooming difficulties. Yet even well-informed clients and their families with whom the project has worked are often unaware of available alternatives. Since there is no one source listing all the alternatives from various manufacturers, even available aids are difficult to locate.

The staff wrote a manual entitled, A Resource Guide to Habilitative Techniques and Aids for Cerebral Palsied Persons of All Ages, with parents and non-professional users in mind which was distributed throughout the Region. The manual includes a chapter on techniques, resources and aids for dressing and grooming.

Adaptive techniques and devices were demonstrated during site visits to residential facilities and at training workshops, and were discussed in other workshops and lectures.

A list of adapted clothing resources was compiled and distributed at workshops and lectures to rehabilitation professionals and forwarded in response to individual inquiries.

14. SELF-CARE IN HYGIENE AND TOILETING

Problems

Problems in self-care in hygiene and toileting are often found among mentally retarded persons and those with cerebral palsy. Restricted ability to perform toileting activities, such as transfers, and to care for personal hygiene often restrict employment or training opportunities since personal attendants are unavailable or expensive. These difficulties can be due to lack of training, poor motor control, incoordination, abnormal reflexes and the like. Difficulties with dental care, washing, bathing and toileting can cause needless dependency, lack of privacy, waste of time and energy, and medical problems as well as social problems.

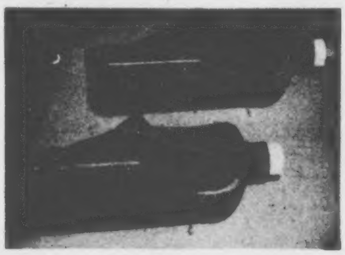
A number of persons referred as clients to the project had problems in these areas, particularly in toileting and dressing activities related to work.

Region III Involvement: 17 clients
4 facilities

Adaptive techniques and commercially-available aids resolved difficulties for a number of individual clients. These included bath seats and pillows, long-handled sponges, inflatable tub inserts to eliminate tub transfers, adapted electric shavers, installation of grab bars for toilet transferring, and button hooks. The "Panty Alert" device using biofeedback methods was located for clients who needed assistance with toilet training.

In other cases, specific adaptations were required for a given person's problem. For example, a toilet seat support was devised for a client who experienced balance difficulty. A letter from this client's parents suggested the value of such aids.

In another case a catheter was needed which could be operated by foot control. Referred to by the staff as the "Angelo Principal," the catheter is emptied by a spring loaded valve, normally closed, which can be opened and emptied by a pulling action -- in this case the toe of the opposite foot.



In another case a female urinal was constructed from a used Dynamo (detergent) bottle to enable one woman to accept a job. The design was publicized in Accent on Living and won a Maddack award.

Similar to the problem with self-care in dress and grooming, information on techniques and devices dealing with self-care in hygiene and toileting is available but not widely known.

The manual written by the staff, A Resource Guide to Habilitative Techniques and Aids for Cerebral Palsied Persons of All Ages, which was widely distributed during the project, includes sections describing techniques, aids and resources addressing self-care in hygiene and toileting issues.

Information about proper positioning for toileting was printed in our quarterly newsletter, Response.

Adaptive techniques and devices were demonstrated during site visits to residential facilities as well as at two training workshops. They were also discussed at other workshops and in lectures.

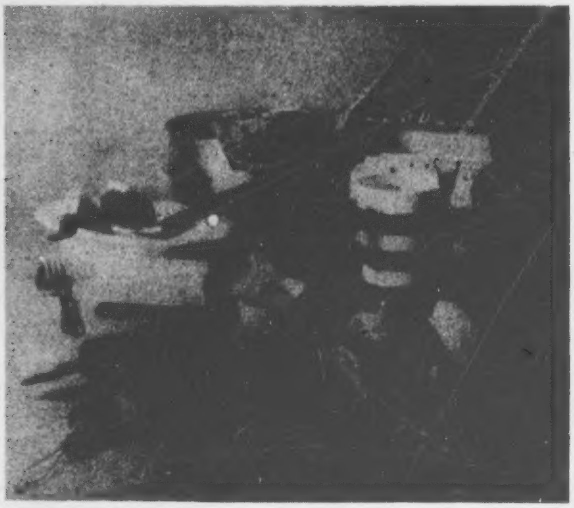
15. DIFFICULTY WITH FEEDING AND ORAL MOTOR CONTROL

Problems

Many persons with cerebral palsy and other developmental disabilities have problems with tongue thrust, inability to chew, difficulty swallowing, drooling, aspiration, hyperactive bite reflex and other areas of oral-motor control. Poor arm, hand and finger control also impair self-feeding. Aside from the obvious impact on nutrition and oral communication, independent feeding can enhance self-esteem, social acceptance, hygiene and ultimately the vocational independence of severely disabled persons.

Region III Involvement: *11 clients*
4 facilities

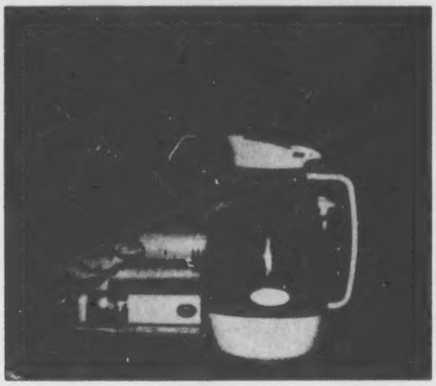
Some clients referred to the project had feeding or other oral motor control difficulties, and many had upper extremity motor control problems that impaired self-feeding. Solutions were worked out for individual clients and recommendations made for new techniques and aids. Aids included utensils with built-up handles, scoop plates, plate guards, long-handled utensils, and cups with adapted handles. Techniques included eating with utensils held by the feet and repositioning devices for better control.



Lack of independence in eating can prevent people from being able to work at a job site or entering workshop, activity center, or training programs. Many times state vocational rehabilitation agency counselors erroneously assume that someone unable to independently eat is not employable.

Several methods and aids emerged that were particularly suited to resolving feeding problems in the worksite.

This wheelchair sandwich holder, constructed of plexiglas, enabled a person with severe manual incoordination to eat lunch. By biting the sandwich and pulling upward with the mouth, the user avoids overhandling the sandwich or messiness due to poor aim.



Use of a liquid lunch, kept in a nontilt, secured cup and drunk through a straw, enabled one person with chewing and drooling problems to enjoy lunch with her co-workers. The long, Polenysian-drink type straw permitted her to keep her head upright while drinking, thereby eliminating drooling.

A tubular, plastic feeding device to overcome tongue thrust was designed and fabricated for several clients to help them master self-feeding in workshop and activity centers.

A drooling control device, described elsewhere in this report, was explored for several clients.

Many devices and techniques are available to solve these problems associated with difficulty with feeding and oral motor control, but information on them is not always available to or known by service providers, parents, teachers, vocational rehabilitation agency counselors and vocational evaluators, or disabled persons themselves in Region III.

The Job Development Laboratory's manual, A Resource Guide to Habilitative Techniques and Aids for Cerebral Palsied Persons of All Ages, was written with parents and nonprofessional users in mind. It includes a chapter on techniques, resources and descriptions of eating aids.

Another manual, Cerebral Palsy and Communication: What Parents Can Do, was also written and distributed. It includes a chapter on oral motor facilitation and describes, for example, ways to position and hold the child to improve feeding.

Adaptive techniques and devices were demonstrated during site visits to residential facilities and discussed in training workshops and lectures given during the project.

PART VII

DISSEMINATION AND TRAINING

16. RESOURCE MATERIALS

Disseminating project findings was undertaken by various means throughout the project. The following resource materials were developed as one method of sharing project information.

Quarterly Newsletter:

Response was initially published to inform survey respondents, from whom the mailing list was drawn, what we were doing and learning about in response to their concerns. The mailing list grew to 750 individuals and institutions during the three year project. Over 100 readers sent in comments, reporting that they found Response concise, helpful, informative and professional, and "always interesting." They reported that they followed up on leads given and were appreciative to receive something in return for their initial efforts. We did include a number of articles suggested by readers.

Response was a source of information and resources. Some articles contained details on aids, equipment and methods devised by the project staff and others for severely disabled consumers. For example, included were devices for head protection, production aids for sheltered workshop employees, and two case histories of the process used by the project staff to place persons severely disabled by cerebral palsy in competitive jobs. Other articles described other projects, films, books, newsletters, and training programs. For example, these included publications on environmental accessibility, a communication newsletter and a communication aids clinic, and Regional training programs for rehabilitation practitioners.

Books, Pamphlet and Videotape:

Four books and one pamphlet were published, and one videotape produced, during the project. The two communication books have been adopted by several colleges (including University of Virginia, George Mason University, and University of Arizona) as textbooks for special education and language development courses. All books were initially provided free of charge to Region III residents who requested a copy. Those residing outside the Region, and those with Region III requesting several or additional copies, were asked to cover the expense of printing and distribution at $6.00 a copy.

The following is a brief description of each resource developed under this project, along with evaluative comments by readers and viewers.

1. Communication Resources: A Guide for Parents, Paraprofessionals and Professionals, September 1977, reprinted July 1979 ($6.00). This book was conceived for those who want to know about specific resource materials on speech and language development and their

uses with developmentally disabled persons. The book was geared for use by speech and language professionals who, we learned, lack uniform training in such techniques or knowledge of resources. However, the book is designed so the nonprofessional can easily use sections of it. The book was announced in Response, the DD Newsletter, the Innovator, and in the newsletter of nonoral alternatives, Communication Outlook. Advisors and heads of other Developmental Disabilities Regional Offices were also supplied with complimentary copies. To date, approximately 800 copies of the book have been distributed, and continuous demand necessitated a second printing in July 1979 (which was partly financed by the Rehabilitation Research and Training Center No. 9 of which the Job Development Laboratory is a part).

Eight speech and language pathologists and one rehabilitation counselor with experience serving communicatively-impaired, developmentally disabled persons contributed to the book. Resources are grouped into chapters on screening and assessment instruments, therapy resources, communication alternatives and devices, sourcebooks, and services. A one-page description of each resource is provided, along with the publisher, price information, and candid comments by contributors concerning the resource's use with developmentally disabled persons.

Feedback was received largely from those we expected to find the book most useful -- service providers. Many found the book "extremely valuable" and "an excellent compilation of resources," and some regarded it as a first step toward meeting an even greater need.

2. Cerebral Palsy and Communication: What Parents Can Do, April 1977 ($6.00) was conceived to offer practical guidelines on "what to do" when faced with various communication disorders presented by cerebral palsied persons. It was distributed through the same channels as Communication Resources for the Developmentally Disabled and to date approximately 800 copies have been distributed. Although designed specifically for the nonprofessional, many professionals have reported it to be quite valuable. Topics that are discussed in detail include the nature of cerebral palsy, the difference between speech and language, a developmental profile, positioning for speech, feeding and oral-motor control, the individual who also has a hearing impairment, breathing and speech, and nonverbal alternatives to speech. Forty-five line drawings illustrate the text.

   Reactions were strongly positive from readers -- both from those who live with and from those who work with someone disabled by cerebral palsy. Some commented, "the manual makes it easy to try out new techniques " (from a parent), and "references and guides following each chapter make it extremely easy to find more information on a chapter." One reader felt more information on language development would have been helpful.

3. *A Resource Guide to Habilitative Techniques and Aids for Cerebral Palsied Persons of All Ages*, June 1978 ($6.00) was designed for all who want to know how to resolve common life-skill problems. The book was announced and distributed through the same channels as the two previous books. In addition, it was shown at the "Book Fair" during the Annual (1978 and 1979) Conference of the American Occupational Therapy Association (AOTA). To date, approximately 400 copies have been distributed.

   The book addresses established treatment approaches for cerebral palsy, positioning and seating, feeding, dressing, hygiene, household and community involvement, and general resources. Each chapter divides the resource listings into three parts -- techniques, aids and references. Cross referencing helps the reader.

   The book received a very positive welcome, with many regarding it as "an excellent reference section" and "very useful." Some readers felt the content applied to a broader spectrum of disabled persons than just those with cerebral palsy. Some constructive suggestions were that "a list of resource *people* and *places* be included" and that "certain contraindications" for aids and devices be addressed.

4. *Working with Cerebral Palsy*, to be published in May 1980 if adequate funds for publication are available to the staff, is designed to foster a problem-solving attitude toward people disabled by cerebral palsy -- to not only help them believe they will be able to work, but also help figure out how to overcome some common difficulties. It was conceived for consumers and their families, as well as for rehabilitation practitioners.

   The book includes interviews with people disabled by cerebral palsy who describe personal and work experiences. For the benefit of the reader, a functional description of each worker accompanies each interview. The book also addresses emotional considerations of the disabled consumer, vocational evaluation methods with severely involved persons, and a listing of alternate methods or aids to alleviate difficulties at work tasks commonly encountered by persons with movement and speech impairment. The book was announced in *Response* and will be publicized more fully when published.

5. *A Resource Guide to Protective Aids*, December 1979 ($2.00) is a 45-page pamphlet describing commercially available protective aids and devices. These are aids which can be used to prevent deformity or further physical deterioration encountered by severely disabled persons as the result of nerve compression, falls, or improper positioning. Categories of aids are described -- as for the head, hands, skin, underlying nerves and/or joints -- the specific aids are named, and the manufacturers or suppliers listed. In cases where unique attributes seem pertinent, these are described. The pamphlet was announced through *Response* and distributed after publication.

6. "An Opportunity to Work: Job Development for Severely Disabled Cerebral Palsied Persons," 1978 ($60.00 each) is a 17-minute, 3/4 inch, color videotape cassette produced by the Job Development Laboratory and Audiovisual Services of The George Washington University Medical Center. Originally conceived as a training tool for vocational evaluators, the tape has been widely used for orientations on the capability of persons disabled by cerebral palsy.

   The tape illustrates case histories of three persons disabled by cerebral palsy and describes steps taken by the Job Development Laboratory to help them achieve competitive employment. Viewer feedback has been enthusiastic and extremely positive. The tape has been used in numerous training programs, and is available both for a free two week loan period and for purchase. To date it has been loaned to approximately 20 facilities for their use.

Articles Published about the Project:

The staff made a strong effort to publicize project findings as well as resource material, so that people would seek the type of technical assistance we were best able to offer. The following are articles that, to our knowledge, appeared describing our project.

1. "Everyday Problems of Multiply Handicapped Persons Addressed at Job Lab," Developmental Disabilities Digest, Summer 1978, published by the Joseph P. Kennedy Foundation, Washington, D.C. This was a general overview of our project and resource material available from us.

2. "Research Staff Design Head Protection Device, Seek Reaction," National Spokesman, March 1978, published by the Epilepsy Foundation of America, Washington, D.C. This article described the prototype and fabrication process of the "hidden" head protection developed during our project.

3. "More GWU RT-9" (The George Washington University's Rehabilitation Research and Training Center No. 9), Innovator, Vol. 4, No. 1, 1979, published by the California State Department of Rehabilitation. This brief article about the project's newsletter Response contained references to some project activities as well.

Advocacy Effort on Behalf of Communicatively- and Multiply-Impaired Developmentally Disabled Persons:

Speech and language associations were contacted about unmet needs of developmentally disabled persons and about lack of professional training in response.

This included national and state personnel affiliated with the American Speech, Hearing and Language Association. The following individuals were provided with two of the manuals (and other resources) developed under project to review. They were encouraged to convey this information to their membership. They were also advised of upcoming training programs to be offered by the project staff.

- Kathleen Griffin, Ph.D., Director, Research and Professional Development, American Speech, Language and Hearing Association
- Linda S. Ferguson, President, Delaware Speech and Hearing Association
- Kathy Hosty, President, District of Columbia Speech and Hearing Association
- Dorothy A. Shannon, Ph.D., President, Maryland Speech and Hearing Association
- Daniel T. West, President, Pennsylvania Speech and Hearing Association
- David C. Narburgh, President, Virginia Speech and Hearing Association
- John R. Owen, President, West Virginia Speech and Hearing Association

To date, Dr. Griffin, Dr. Dabul, and Ms. Shannon have responded with encouraging news. Dr. Griffin felt the project materials were both "innovative and excellent for use in training speech-language pathologists and audiologists." She offered to transmit materials to the Director of Urban and Ethnic Program, who is assigned responsibility for developing professional training to make quality services more available and accessible to the severely and profoundly handicapped persons. Dr. Barbara Dabul is forwarding our materials to a professional committee of ASLHA whose interest is in communication. She plans to display our material on non-oral communication at a June 1980 Conference of Rehabilitation International. Dr. Shannon suggested describing the materials in a professional newsletter to Maryland members. We still continue to contact professional members to disseminate information and make them aware of upcoming materials.

A similar effort was made to contact occupational therapists. The American Occupational Therapy Association has reviewed both communication manuals and the resource book compiled by Elizabeth High, O.T.R. They found A Guide to Habilitative Techniques and Aids for Cerebral Palsied Persons of All Ages to be so valuable that they requested it be included in their "Publications Mart" to exhibit new books at their annual conference April 23-25 in Detroit.

17. TRAINING ACTIVITIES

Formal Training Programs Sponsored by the Job Development Laboratory

The staff planned seven formal training programs with respect to project findings for a total of 220 Region III participants. A description of the content of these programs, along with evaluative comments by participants, are provided below.

1. "Increasing Productivity of Workers in Sheltered Industry" was held on three occasions: June 29, 1978, September 21, 1978, and February 15-16, 1979. A total of 72 participants attended; these were largely production managers and supervisors from sheltered workshops and work activity centers. The format for all programs was identical, with the exception that once the program was extended to two days to include a demonstration in the use of plastics to fabricate production fixtures.

   The program included: methods used by competitive industry to promote efficiency, including Methods-Time-Measurement (MTM) principles, production fixtures, and work-flow set up to aid productivity; application of this technology to sheltered industry; factors to assist physically and learning disabled workers; and locating professional consultation services. The program also included demonstrations of how to solve production problems, and group problem-solving with participant raised problems and work samples which were brought by the participants.

   Almost without exception, participants rated the trainers' performance and program content as "very good" to "excellent." Many were interested in group problem-solving and occasionally regretted lack of involvement by other participants. Jay Belding, the speaker who assisted in conducting the training, reported that on three or four occasions he was subsequently invited to facilities to consult directly with them, and several times received visitors at his facility, Associated Production Services (365 Andrews Lane, Trevose, Pennsylvania 19047, 215/365-0211).

2. "The Functional Approach," was co-sponsored by the Job Development Laboratory and Elwyn Institute and was held on August 17, 1979 at Elwyn, Pennsylvania for 17 participants. The program was designed for those who provided services to developmentally disabled persons with physical disabilities and those interested in a functionally-based approach to vocational planning.

   The program included discussion and exercises on: methods of functional evaluation; ways to modify standard evaluation practices to accommodate physically disabled persons; assessing and enhancing vocationally-related self-care activities; and improving work functioning by (a) matching worker and job; (b) selecting methods to optimize performance of a task; and (c) selecting ways to modify the work environment.

Participants generally evaluated the program as "very good" with several suggesting a longer program and much enthusiasm about the workshop exercises. Many felt what they had learned had immediate applications at their facilities. In fact, participants enjoyed the opportunity to solve problems on their own and wished they had come better prepared with client case histories to raise for discussion.

3. "Practical Aspects of the Technical Support Services Project," a three-hour program, was conducted at the request of the Southern Maryland Region Association of Directors of Community-Based Programs for the Developmentally Disabled at the Melwood Horticultural Center, Upper Marlboro, Maryland, on November 10, 1978. Eighteen participants attended.

   The program focused on ways to enhance self-care, independence, and sheltered work performance of developmentally disabled persons. Participants were impressed with the applicability of the information to their clients and regarded the program as extremely valuable.

4. "Let's Work Together -- A Family Workshop" was collaboratively sponsored by the D. C. Developmental Disabilities Planning Council and the Job Development Laboratory on May 18, 1978. Thirteen District of Columbia families having a severely disabled member were invited to attend. The program was conceived to acquaint D. C. consumers with services available through our, as well as other local projects, sponsored by the Regional Office of Developmental Disabilities. The project staff informally described their work in response to needs raised by the families. All participants felt the program answered their specific concerns and was a productive experience. Many wished that the program had been longer and more in-depth, and wished for a regularly scheduled meeting of this sort.

5. "Unmasking Abilities in the Developmentally Disabled," a three-day conference, was planned for March 11-13, 1980 to conclude our project. The program was designed to inform 100 Regional participants (both consumers, their families, and service providers were invited) about innovative approaches and programs designed for severely involved, developmentally disabled persons. Seventeen speakers were invited to address the group to describe a wide range of approaches including one-to-one on the job training, individualized evaluation services, positioning techniques and aids, and a system to match nonoral individuals with appropriate communication aids, among others.

   Due to an insufficient number of registrants, the conference was cancelled. However, the project staff is planning to publish the proceedings, consisting of papers submitted by the speakers which would have been delivered at the conference, and distribute this publication to those who did register for the conference as well as any other interested persons. The proceedings are scheduled to be published in May 1980, provided funds for printing are available.

Presentations at Conferences Not Sponsored by the Job Development Laboratory

There were numerous occasions when the staff participated in conferences and programs sponsored by others, using that opportunity to disseminate project findings or offer training pertinent to the project. We have reached an estimated 575 persons through this means.

The following is a list of these presentations. When the staff requested evaluations on these occasions, comments invariably ranged from "very good" to "outstanding"

DATE	TOPIC & SPEAKER	CONFERENCE NAME & SPONSORING FACILITY	NUMBER OF PARTICIPANTS
11-2-77	Adaptive Devices & Their Relationship to Employment Possibilities, E. Shaver	The First Annual Vocational Conference, sponsored by the Physically Handicapped Department of Fairfax County, VA Public Schools, Annandale, VA	250
7-11-78	Problems of Access & Accommodation, E. Shaver	"The Disabled Employee Working for D.C. Government," D.C. Office of Human Development Services	40
9-29-78	Job Modification, E. Shaver & J. Frank	"Seminar on Selective Placement of the Handicapped," U.S. Civil Service Commission (OPM), D.C.	18
1-5-79	Job Modification, E. Shaver & J. Frank	"Seminar on Selective Placement of the Handicapped, U.S. Civil Service Commission (OPM), D.C.	30
3-30-79	Adaptive Aids in Sheltered Workshops, E. Shaver	"The World of Work and the Severely Retarded," by National Children's Center in D.C.	100
5-2-79	Job Adaptation for Handicapped Workers, E. Shaver	President's Committee on Employment of the Handicapped, Workshop Committee Meeting	35

DATE	TOPIC & SPEAKER	CONFERENCE NAME & SPONSORING FACILITY	NUMBER OF PARTICIPANTS
9-11-77	Recent Innovations in Rehabilitation of the D.D., K. Mallik	National Rehabilitation Association Annual Conference, Washington, DC	105
10-7-77	Section 501: Empoloyment within the Federal Govt., K. Mallik	Mayor's Committee on the Handicapped, Washington, D.C.	57
10-14-77	Need to Move Vocational Rehabilitation into Industry, K. Mallik	Ohio Rehabilitation Association 22nd Annual Conference, Columbus, Ohio	125
10-23-77	Job Re-Engineering, K. Mallik	Michigan Rehabilitation Association Annual Conference, Traverse City, Michigan	265
6-1-77	A Practical Design Approach to Rehabilitation Products, J.Mueller	Fourth Annual Conference on Systems and Devices, Seattle, Washington	89
10-14-79	Gainful Employment for the Handicapped, K. Mallik	Florida Rehabilitation Association and the Florida Chapter of the American Association of Mental Deficiency, Orlando, Florida	169
8-27-79	Concealable Head Protection for Seizure-Prone Individuals, J. Mueller	Interagency Conference on Rehabilitation Engineering, Atlanta, Georgia	85
4-25-80	Simple Devices Provide Solutions to Complex Problems, K. Mallik	Annual Conference, Council for Exceptional Children, Philadelphia, Pennsylvania	105

DATE	TOPIC & SPEAKER	CONFERENCE NAME & SPONSORING FACILITY	NUMBER OF PARTICIPANTS
8-13-79 8-14-79	Individualized Evaluation Program Leading to the Rehabilitation Plan, S. Yuspeh, E. Shaver	"Vocational Evaluation and the More Severely Disabled" Woodrow Wilson Rehabilitation Center, Fishersville, VA	100

Inservice Presentations and Consultations

The staff provided, on numerous occasions, inservice training and consultations to various programs and facilities concerned with developmentally disabled persons, particularly those with multiple or severe involvement. The following is a list of such activities.

DATE	TOPIC & SPEAKER	FACILITY REQUESTING INSERVICE	NUMBER OF PARTICIPANTS
1-12-78	Show "Opportunity to Work" to GWU Medical Center Staff, K. Mallik, E. Shaver	GWU Medical Center	40 (MD's, OT's, PT's, RN's)
1-19-78	Inservice on adaptations to enhance sheltered work performance & self-care independence, E. Shaver, E. High	Fairfax Opportunities Unlimited, Sheltered Workshop, Fairfax, VA	12 (rehab. counselors & workshop mgrs.)
4-27-78	Inservice on methods to increase building accessibility, self-care, work functioning and communication skills, E. Shaver & E. High	Ardmore Developmental Work Activities Center, Laurel, MD	5 (special educators, rehabilitation counselors)
5-17-78	Consult on vocational evaluation w/ severely, multi-handicapped, E. Shaver, High	D.C., MD, VA Vocational Rehabilitation Agencies	12 (vocational evaluators)

DATE	TOPIC & SPEAKER	FACILITY REQUESTING INSERVICE	NUMBER OF PARTICIPANTS
6-12-78 6-20-78	Employer orientation to hiring the MR, co-worker orientation, E. Shaver	Watkins Johnson, Gaithersburg, MD	4 supervisors 20 co-workers
6-16-78	Consult w/university to resolve common life skill problems of severely disabled students, E. Shaver	Maryland University, College Park, MD	1
7-14-78	Job analysis and employer/coworker orientation to hiring severely physically disabled persons, E. Shaver, J.Frank	Potomac Lung Association, Fairfax, VA	6
7-16-78 4-23-79	Consult on job placement techniques & counseling with DD, E. Shaver	Richmond Department of Vocational Rehabilitation	1
8-14-78 10-5-78 12-5-78	Consultation re: positioning walker for DD children, J.Frank	Children's Program, Centers for the Handicapped, Silver Spring, MD	1 (OT)
8-15-78 8-30-78 9-13-78	Acquaint staff w/ positioning and feeding techniques for severely disabled, J. Frank	Central Fairfax Services, Fairfax, VA	4 (special educators & rehabilitation counselors)
8-23-78	Inservice on work setup & adaptation for work activity center, E. Shaver	Hope Center, Indian Head, MD	15 (rehabilitation professionals & special educators)

DATE	TOPIC & SPEAKER	FACILITY REQUESTING INSERVICE	NUMBER OF PARTICIPANTS
8-28-78	Consultation with vocational evaluators re: severely involved clients, E. Shaver, J. Frank	D.C. Association for Retarded Citizens: Forest Haven Vocational Evaluation Unit, MD	2 (vocational evaluators)
9-13-78 5-14-79	Consultation re: vocational planning, job placement, job modification for those w/cerebral palsy, E. Shaver, E. High	United Cerebral Palsy Governmental Affairs Office Washington, D.C.	5 6
9-18-78 10-28-78 2-5-79 5-1-79	Introduction to TSS project and orientation to JDL activities at GWU, K. Mallik, E. Shaver, S. Yuspeh, J. Frank	Various state vocational rehabilitation agencies, rehabilitation facilities & consumer agencies	32 (rehabilitation counselors, administrators, service providers)
10-3-78	Orient students to JDL programs, E. Shaver, J. Frank	GWU Department of Rehabilitation Counseling	3
10-14-78	Prevocational & sheltered work program for multi-handicapped, E. Shaver, K. Mallik	The Woods School, Langhorn, PA	2
11-17-78 9-14-79	Orient OT students to rehabilitation techniques, J. Frank	Howard University, D.C.	12 6
12-14-78	Consultation re: accessibility of high school vocational training programs to DD persons, E. Shaver, J. Frank	Arlington Career Center Arlington County Schools, Arlington, VA	4 (special educators and rehabilitation counselors)

DATE	TOPIC & SPEAKER	FACILITY REQUESTING INSERVICE	NUMBER OF PARTICIPANTS
12-17-78	Consult on early intervention and training materials for families w/CP member, E. Shaver	Sewell Rehabilitation Center, Denver, Colorado	1 (rehabilitation counselor)
2-28-79	Describe and demonstrate concealable helmet, J. Frank	Fairfax Hospital Orthotics/Prosthetics Laboratory, Fairfax, VA	3 (orthotists)
1/17/78	Consult on job adaptations with employer, J. Frank, K. Mallik, E.Shaver	G.W.U. Library, Washington, D.C.	3 (employer, co-workers, staff)
2-23-79	Inservice on vocational rehabilitation applications of occupational therapy, J. Frank	National Institute of Health Rehabilitation Medicine Staff, Bethesda, MD	12 (OT's, PT's, MD's)
3-13-79	Consult on protective aids, training manuals & behavior techniques w/MR, E. Shaver	Futures Rehabilitation Center, Inc., Choudersport, PA	2
3-15-79	Consult on common life skills problems among DD, language enhancement & independent self-care, E.Shaver	Georgia Rehabilitation Center, Athens, GA	1 (rehabilitation counselor)
3-22-79	Inservice on vocational rehabilitation techniques, J. Frank	Northern Virginia Physical Therapy Association, VA	20
3-21-79	Adaptive aids of GWU Medical Ctr., K.Mallik, J.Frank	G.W.U. Medical School, Washington, D.C.	15

DATE	TOPIC & SPEAKER	FACILITY REQUESTING INSERVICE	NUMBER OF PARTICIPANTS
4-18-79	Orientation to JDL concept of employment for severely involved DD persons, J. Frank	Walter V. Carter Center, Baltimore, MD	1 (OT)
4-22-79	Consult re: vocational planning & skill enhancement w/severely involved E. Shaver, J.Frank	John F. Kennedy Institute, Baltimore, MD	2 (social workers)
4-24-79	Discuss drooling control device, J. Frank	Jacob Harris, D.D.S., Washington, D.C.	1
5-8-79	Demonstrate communication devices & vocational possibilities of severely disabled persons, K. Mallik, E.Shaver, POSSUM	G.W.U. Medical Center Staff, Washington, D.C.	15 (OT's & PT's)
5-19-79	Consult re: head protection & adaptive aids for competitive/sheltered work, E. Shaver, J. Frank	Occupational Services, Inc., Chambersburg, PA	2 (rehabilitation counselor & production manager
6-15-79	Consult re: communication aids & resource people, E. Shaver	Regional Education Service Agency VIII, Martinsburg, WV	1 (rehabilitation counselor)
6-27-79	Inservice on protective aids, K.Mallik, J.Frank	DC, MD, VA Rehabilitation Counselors	10
7-18-79	Discuss vocational evaluation with severely disabled persons, J.Frank	Joseph H. Rose & Assoc., Washington, D.C.	2

DATE	TOPIC & SPEAKER	FACILITY REQUESTING INSERVICE	NUMBER OF PARTICIPANTS
7-23-79 8-21-79	Inservice consultation re: making vocational evaluation services accessible to the severely disabled, E. Shaver, J. Frank	D.C. Association for Retarded Citizens and Forest Haven, MD	1 4 (vocational evaluators)
11-12-79	Consultation on communication aids and program evaluation, E. Shaver	Cohope, Keezletown, WV	10 (consumers) 5 (special educators and speech pathologists)
2-16-80 2-17-80	"An Approach to Greater Independence," K. Mallik, E. Shaver	Department of Public Welfare, Office of Mental Retardation, Harrisburg, PA	60

Visitors

The Job Development Laboratory is frequently visited by rehabilitation professionals, consumers, families of consumers, educators from special education programs, etc. from Region III and other Federal regions. To accommodate these visitors and provide them with information, the Laboratory has been organized with a videocassette player, a display board, publications, examples of assistive aids, and examples of equipment which has been modified to meet the employment needs of severely involved developmentally disabled persons. Innumerable visitors have been made aware of the project's findings through this means of dissemination.

PART VIII

CLIENT CHARACTERISTICS

18. CLIENT CHARACTERISTICS

The following chart depicts the characteristics of the clients with whom the project staff worked during its three year term -- state of residence, age, sex, diagnosis, and services provided.

				DIAGNOSIS						VOC		PRE VOC	MED	IND. FUNCTIONING						SELF-CARE		
					Cerebral Palsy																	
Client	State of Residence	Age	Sex	Mental Retardation	Athetoid	Spastic	Ataxic	Epilepsy	Other	Competitive	Sheltered	Evaluation	Nerve Compression	Communication	Head Protection	Drooling/Head Control	Seating/Positioning	Self-Abuse	Mobility/Transfers	Dressing/Grooming	Hygiene/Toileting	Feeding
1	VA	2	F	●	●	●	●							●		●						
2	VA	3	M	●	●	●	●							●		●						
3	MD	3	F		●	●			●										●			
4	VA	3	F	●	●	●							●	●								
5	MD	3	F		●	●	●							●					●			
6	VA	4	M	●	●	●		●						●			●					
7	MD	4	F		●	●													●			
8	VA	4	F		●				●				●	●								
9	VA	4	M		●								●	●								
10	MD	4	M	●	●														●			
11	MD	4	F	●			●												●			
12	ML	4	F	●			●										●		●			

				DIAGNOSIS						VOC		PRE VOC	MED	IND. FUNCTIONING							SELF-CARE	
					Cerebral Palsy																	
Client	State of Residence	Age	Sex	Mental Retardation	Athetoid	Spastic	Ataxic	Epilepsy	Other	Competitive	Sheltered	Evaluation	Nerve Compression	Communication	Head Protection	Drooling/Head Control	Seating/Positioning	Self-Abuse	Mobility/Transfers	Dressing/Grooming	Hygiene/Toileting	Feeding
13	MD	4	F		●	●	●							●					●			
14	MD	5	M	●	●	●													●			
15	WV	5	M	●					●					●			●					
16	VA	5	F										●	●								
17	MD	5	M	●					●								●					
18	DC	5	F															●				
19	DC	6	M		●	●	●							●								
20	VA	6	F	●	●	●							●	●					●			
21	MD	7	M			●			●					●		●		●		●		
22	VA	7	M			●			●					●								
23	MD	9	F			●	●									●					●	●
24	MD	10	M	●					●					●			●	●		●	●	●
25	VA	11	M	●				●							●							

				DIAGNOSIS						VOC		PRE VOC	MED	IND. FUNCTIONING						SELF-CARE		
					Cerebral Palsy																	
Client	State of Residence	Age	Sex	Mental Retardation	Athetoid	Spastic	Ataxic	Epilepsy	Other	Competitive	Sheltered	Evaluation	Nerve Compression	Communication	Head Protection	Drooling/Head Control	Seating/Positioning	Self-Abuse	Mobility/Transfers	Dressing/Grooming	Hygiene/Toileting	Feeding
26	MD	12	M						●	●							●			●	●	
27	MD	12	F	●	●	●	●										●		●		●	
28	VA	12	M	●	●	●							●	●								
29	VA	13	M	●				●							●							
30	VA	13	F	●									●									
31	MD	13	M											●								
32	VA	13	M	●	●	●	●		●					●								
33	VA	14	M	●									●									
34	VA	16	M	●	●	●	●						●	●								
35	DC	16	F					●	●						●				●		●	
36	VA	16	M	●									●									
37	DC	17	F	●		●	●		●		●						●					
38	DC	17	F						●	●		●										
39	VA	17	M	●				●							●							

85

				DIAGNOSIS						VOC		PRE VOC	MED	IND. FUNCTIONING						SELF-CARE		
					Cerebral Palsy																	
Client	State of Residence	Age	Sex	Mental Retardation	Athetoid	Spastic	Ataxic	Epilepsy	Other	Competitive	Sheltered	Evaluation	Nerve Compression	Communication	Head Protection	Drooling/Head Control	Seating/Positioning	Self-Abuse	Mobility/Transfers	Dressing/Grooming	Hygiene/Toileting	Feeding
40	MD	18	F	●					●					●							●	
41	VA	18	F		●				●			●					●		●		●	●
42	WV	18	M	●	●	●											●					
43	VA	18	M	●		●										●						
44	VA	19	M	●	●				●			●	●				●			●		●
45	CT	20	M		●					●		●					●					
46	MD	20	F			●					●	●					●					
47	MD	20	M	●	●	●					●	●							●			
48	VA	20	F	●		●	●				●											
49	VA	21	F	●	●	●						●		●			●				●	●
50	VA	21	F	●	●	●	●					●		●					●		●	●
51	MD	21	M	●					●			●										
52	MD	22	F		●	●	●	●						●	●							
53	DC	22	M		●					●		●					●		●	●	●	

				DIAGNOSIS						VOC		PRE VOC	MED	IND. FUNCTIONING						SELF-CARE		
					Cerebral Palsy																	
Client	State of Residence	Age	Sex	Mental Retardation	Athetoid	Spastic	Ataxic	Epilepsy	Other	Competitive	Sheltered	Evaluation	Nerve Compression	Communication	Head Protection	Drooling/Head Control	Seating/Positioning	Self-Abuse	Mobility/Transfers	Dressing/Grooming	Hygiene/Toileting	Feeding
54	MD	22	F	●		●					●	●								●	●	●
55	NY	22	M			●						●										
56	MD	23	F	●					●		●											
57	SC	23	F						●	●	●											
58	VA	23	M			●				●	●	●		●			●					●
59	DC	23	F			●	●				●											
60	VA	23	M	●			●				●	●					●				●	
61	VA	23	F	●									●									
62	VA	24	F	●					●		●											
63	VA	24	F	●		●				●	●	●								●	●	
64	OH	24	M		●							●										
65	VA	25	F	●				●		●					●							
66	MD	25	M	●					●			●					●					
67	VA	25	F		●	●			●	●		●						●				

				DIAGNOSIS						VOC		PRE VOC	MED	IND. FUNCTIONING						SELF-CARE		
					Cerebral Palsy																	
Client	State of Residence	Age	Sex	Mental Retardation	Athetoid	Spastic	Ataxic	Epilepsy	Other	Competitive	Sheltered	Evaluation	Nerve Compression	Communication	Head Protection	Drooling/Head Control	Seating/Positioning	Self-Abuse	Mobility/Transfers	Dressing/Grooming	Hygiene/Toileting	Feeding
68	VA	26	M	●		●					●											
69	DC	26	M						●		●	●										
70	VA	27	M						●		●	●					●					
71	DC	27	M	●							●											
72	CT	27	M		●	●			●	●				●								
73	MD	28	M	●							●											
74	DC	28	F		●	●				●		●								●	●	
75	CT	28	M		●							●										
76	DC	28	F							●		●										
77	DC	28	F			●				●		●					●				●	
78	VA	29	M	●									●									
79	MD	30	F	●					●									●		●		
80	FL	30	M		●				●	●		●										
81	DC	30	F	●		●						●										

				DIAGNOSIS						VOC		PRE VOC	MED	IND. FUNCTIONING						SELF-CARE		
					Cerebral Palsy																	
Client	State of Residence	Age	Sex	Mental Retardation	Athetoid	Spastic	Ataxic	Epilepsy	Other	Competitive	Sheltered	Evaluation	Nerve Compression	Communication	Head Protection	Drooling/Head Control	Seating/Positioning	Self-Abuse	Mobility/Transfers	Dressing/Grooming	Hygiene/Toileting	Feeding
82	VA	31	M							●	●	●		●		●						●
83	VA	31	F				●				●											
84	DC	31	M						●		●	●										
85	DC	34	M		●		●			●							●					
86	VA	34	M		●	●			●		●	●		●						●	●	●
87	FL	36	M		●							●										
88	DC	37	M			●				●										●		
89	CT	40	F					●							●							
90	VA	46	M		●	●				●		●								●	●	●
91	DC	48	M			●				●		●					●		●			
92	PA	51	M						●						●							
TOTALS:			M= 52 F= 40	46	37	42	19	8	29	19	21	32	13	27	8	6	21	6	16	12	17	11

CENTERS FOR THE HANDICAPPED, INC.
Children's Program

December 18, 1978

To:	Jim Mueller	From:	Roberta Liebman, Speech Pathologist
Re:	Lighted Picture Box		

The Children: The lighted box was used with two little girls between the ages of two and three. Both are spastic quads, but one is significantly more impaired, physically and intellectually, than the other. The girls were not expected to use the box to communicate. We wanted the box to help us teach them: (1) that pictures have a meaningful relationship with real objects (e.g. a picture of a child eating was shown at lunch time); and (2) that other people can use pictures to communicate by illuminating a picture (e.g., You're going to the potty). Understanding of these concepts seems to us to precede the use of more complex systems of picture communication.

Our Observations: The less severely impaired child learned to illuminate the picture when situational and verbal cues were presented. The use of the lighted picture of the potty seemed to increase her motivation for toilet training. She understood the use of pictures at mealtime. When seated comfortably, she was able to lift her hand onto the box, and she could see the illuminated picture. We thought that she would make good use of a 3 picture light unit. Unfortunately, she moved during the summer and now attends James R. Randall School in P.G. County

The second little girl has adequate visual acuity; she never learned to relate pictures to reality. She still does not recognize photographs of family members. Our use of the lighted box helped us understand this child's perceptual and intellectual deficits. Although we did not achieve our goals with her, we did increase our understanding of her educational and communication needs.

This child had additional problems. She has so little mobility in her arms and shoulders that she was never able to lift her hand up onto the box without adult assistance. Because of poor head control, she was not able to keep her head in position for viewing the picture for more than a few seconds.

The Box Itself:

(1) The portability of the box must be maintained when other modifications are made.

(2) The level of mechanical ingenuity commonly found in a school was probably overestimated when the box was built. Our staff had difficulty making minor repairs. As a result, the box was often out of use for several days at a time.

(3) The height of the box needs to be reduced to make the box useful to young severely handicapped cerebral palsied children. I understand this is essentially a problem of light diffusion. Perhaps you have already found materials which will help solve this problem.

(4) The on-off switch is most sensitive in the center of the box, but the children often are unable to get their hands directly on target. When the outer edge of the picture is touched the light does not go on. In the early stages of training picture communication, it would be helpful to have a switch that is extremely sensitive throughout the picture area.

Summary: The basic idea of the box is to illuminate the picture being referred to. We think this works better with young children than the commercially available boards that simply associate a light bulb with the pictures.

We hope you will continue working on this idea and will share your inspirations with us.

With many thanks from all of us.

Appendix B

THREE CASE HISTORIES OF NORTHERN VIRGINIA TRAINING CENTER RESIDENTS LEARNING TO USE ELECTRONIC AIDS FOR NONVOCAL COMMUNICATION

I

M. is a 13½ year old adolescent. He is quadriplegic with severe extensor thrust, spasticity, athetosis and brain stem level reflexes. His level of intellectual functioning was recorded as "moderate retardation," although accurate formal assessment was not possible due to extreme physical involvement. He was previously able to communicate only by facial responses to Yes/No questions. Although able to recognize numerous Rebus symbols, use of a communication board requiring manual pointing or a head pointer had been unsuccessful due to physical limitations. He learned to operate a light pressure switch attached to a two-choice lighted communication device, and within two months graduated to using a display surface with four possible choices, which was also constructed by the project staff. Positioning and state of relaxation were critical to his prompt and accurate use of the control switch. Two to fourteen selections per sixty seconds were possible when he was positioned in a straddle chair with supporting wing back and built-up front tray. The communication device was placed on the tray and the switch manually positioned by the trainer several inches above the tray, close to his left hand which he used to operate the switch. He was not permitted to use asymmetrical or symmetrical tonic neck reflexes to effect hand movement.

II

J. is a 12 year old nonvocal boy who has cerebral palsy and is considered severely retarded. He walked with support but exhibited total extension patterns and symmetrical tonic neck reactions. He was able to communicate by pointing to pictures when given their names or their functions by the trainer, had receptive language that measured between two and two-and-a-half years, and expressed himself by a gestural yes and no and simple signs. It took this child approximately two-and-a-half months (two or three sessions per week) to learn to use the two-choice device. The longest period was spent in overcoming his desire to simply play with the switch. (Since it was much easier and more fun for him to activate the switch rapidly in an uncontrolled manner than to move the switch slowly with control, he found it more reinforcing to flash the light rapidly than any consequence he could request by lighting a certain picture.) It was first determined that J. could recognize the six pictures used in training (cookie, juice, ball, car, bell, and music box) by having him point to them on request. J. had little success in the first few sessions. Visual attention to the lighted picture was poor, as J. tended to focus attention on the switch. It was unclear if he understood that each press of the switch moved the light one space -- or that the light indicated his choice. To resolve this, the pictures were removed and J. was given several weeks of training on simply moving the light to the side indicated by the trainer's hand. Then two pictures were placed in the box again, and J's task was to "show me what you want." He was allowed to move the light until he was ready to stop, and was instructed to raise his hand (his "yes" signal) when he made his choice. J. was immediately given the item he chose and his attention was again directed to the picture he had lighted. After one month at this task, J. seemed to have made the connection between the light, the picture and the resulting consequence. At this point he was again asked to light a given picture on the trainer's request and was then able to perform accurately in seven out of ten trials. This increased to nine out of ten over the next month. At least half of each session continued to be devoted to allowing J. to tell the therapist what he wanted. This was to demonstrate to him how pictures can be used functionally for expression. J. is expected to next try the four-choice box, which has a switch that should be easier for him to handle. Since J. was able to point to one of four pictures spread out far apart on his desk, he is expected to have no difficulty using a four-choice machine.

III

C. is a 16 year old disabled by cerebral palsy and labelled as moderately retarded. He was able to balance himself sitting and control his head, but was unable to use his hands well. Although C. was able to speak, he was quite difficult to understand. C. was trained on the four-choice communication device. Being more mature and having a stronger desire to communicate than J., C. played with the switch for only two sessions before settling down to learning how to control it. He activated it by making a gross movement with his fist to depress the lever (the switch box turned upside down) and sliding his fist off. All training for C. was done in a functional manner, requiring him to indicate by selecting action pictures of what he wanted to do (drink juice, throw the ball, etc.). He was also required to verbalize his desires when he had lighted the corresponding picture. As a test, C. was asked to "show me how you say 'I want to play ball.'" He responded correctly between nine and ten out of ten trials on the last three sessions. This progress took approximately six weeks. C. was since discharged from NVTC.

Appendix C

CONCEALABLE HELMET FOR SEIZURE-PRONE INDIVIDUALS

by

James L. Mueller, Research Associate
Job Development Laboratory
The George Washington University
Rehabilitation Research and Training Center (RT-9)
Washington, D.C.

I. The Problem:

In 1976 the staff of the Job Development Laboratory began a research project entitled, "Technical Support Services to the Developmentally Disabled in Region III," by surveying Region III facilities on their specific technical support needs. Their responses indicated that one of the most common problems was the need for suitable head protection for persons suffering seizures or with self-abusive behavior.

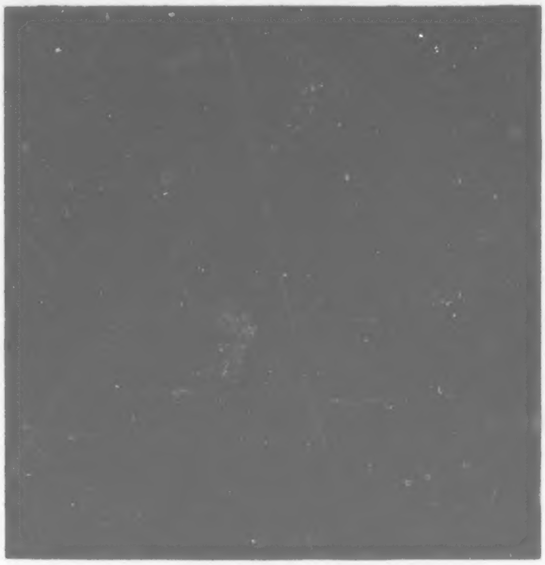
Investigation into available sports equipment revealed a new product -- the Cooper SK-600 hockey helmet -- which was well suited to meet these needs. Washable, well-balanced, and providing full protection to the head, it also has a hinged face shield which makes feeding easier than with conventional fixed-shield helmets. This Cooper helmet is now commonly used in institutions.

In spite of its benefits, however, this hockey helmet still has the drawback of being quite conspicuous. For non-institutionalized, seizure-prone persons, appearance is a major consideration. Many choose to risk head injury rather than wear an attention-drawing sports helmet. Many, therefore, bear scars of repeated injuries from falling. Since no cosmetically acceptable helmet was available, the Laboratory set out to develop a thin, light weight helmet which could be concealed beneath a cap, wig, or other inconspicuous headgear. The design was intended to alleviate the following problems common to conventional protective headgear:

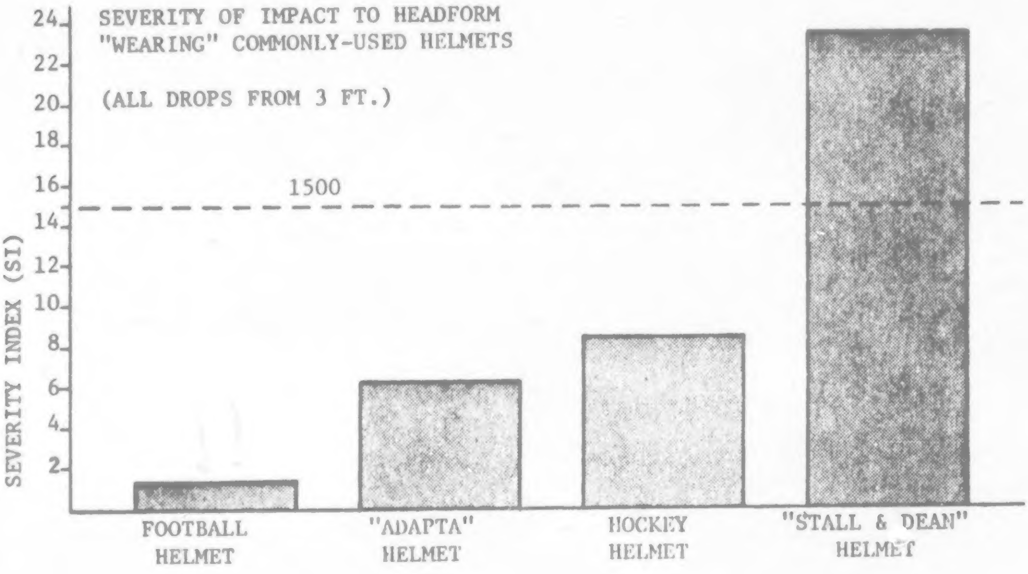
- Excessive weight compounding balance and fatigue problems
- Excessive size and unnatural appearance
- Poor ventilation
- Poor fit, especially for children or persons with abnormally shaped heads
- Difficulty keeping helmet clean

II. Process

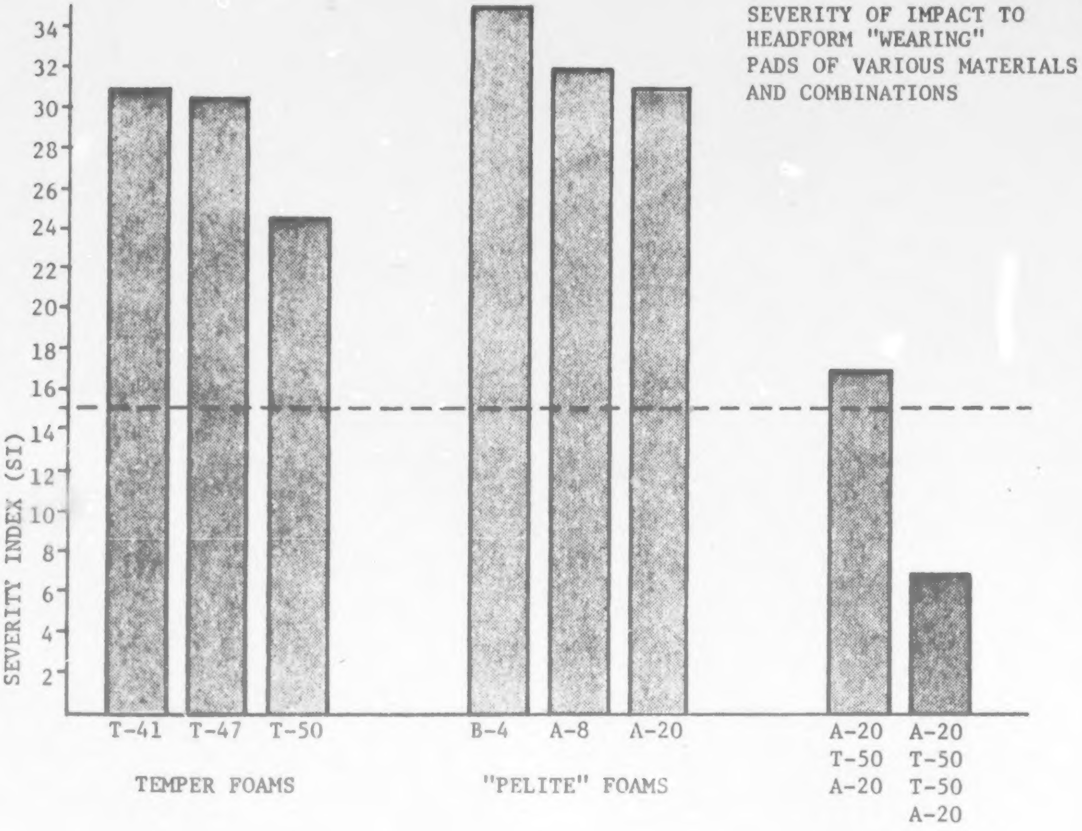
The first step in developing the new helmet was to find a suitable material which could provide adequate protection from head injuries. At the National Bureau of Standards' Product Safety Technology Division, Mr. R. Berger and Mr. N. Calvano conducted a study comparing helmets which were commonly used in institutions. The Severity Index (SI), a measurement of human tolerance to cerebral concussion, was computed by dropping an instrumented headform "wearing" each helmet onto a floor pad from a constant height, as shown:



Although an SI of 1500 is considered the limit of tolerance above which concussion is likely, the Index is best used as a comparative, rather than absolute, measure of a device's protective qualities, since so many other factors (type of fall, surface of impact, etc.) may contribute to the severity of head injury. Following are the results of the initial testing:



The Laboratory staff then began experimenting with various materials having the qualities of light weight and high shock absorption. The most appropriate materials seemed to be Temper Foam or T-Foam (manufactured by Edmont-Wilson, Coshocton, Ohio 43812, 614/622-4311, Attn. Bruce Larson) and Pelite high density polyethylene foam (distributor: Pel Supply Co., 4472 West 160th Street, Cleveland, Ohio 44135). T-Foam, a NASA-developed, resin impregnated foam, has excellent shock absorption but is relatively sensitive to moisture and chafing. Pelite polyethylene foam, on the other hand, is well suited for long term skin contact and is often used as a socket liner in light weight prostheses. A logical combination, then, seemed to be to sandwich T-Foam within layers of Pelite polyethylene foam. Various densities of these Pelite/T-Foam/Pelite "sandwiches" were then compared with the following results:

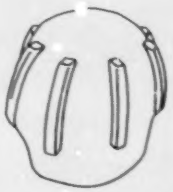


SEVERITY OF IMPACT TO HEADFORM "WEARING" PADS OF VARIOUS MATERIALS AND COMBINATIONS

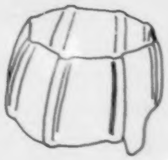
As may be readily seen, the A-20/double T-50/A-20 pad performed nearly as well as the ADAPTA helmet (see figure 1) which is .75 inches thick. This effective "sandwich," however, was still very thick (about .70 inches) and did not meet the specific need for which it was intended, namely, to be unobtrusively concealed beneath common headgear. The Laboratory staff, therefore, decided to proceed with the thinner, single T-Foam "sandwich" (about .50 inches), perhaps applying a double T-Foam pad where maximum protection of specific areas was essential.

Having arrived at a "sandwich" using ¼" T-50 T-Foam within inner and outer layers of ¼" A-20 Pelite polyethylene foam, the Laboratory began to examine fabrication techniques. Since good fit is essential to appearance and protection, each helmet was vacuum-formed on an individually made plaster headform for perfect, custom fit. After preparing the plaster head casting, several 3/8" rubber strips were added to the form to provide ventilation tunnels in the finished helmet. The Pelite inner liner of the helmet was then vacuum-formed over the headform and rubber strips and trimmed to the hair line. Pads of T-Foam were then glued to the inner Pelite liner between the ventilation tunnels. The outer layer of Pelite was vacuum-formed over the other built-up layers, trimmed to the hair line, and all edges were contact-cemented. Finally, the top section was removed for ventilation and this edge was also contact-cemented. The completed helmet was about .50" thick and weighed about 2 ounces, as compared to the ADAPTA helmet which is approximately .75" thick and weighs 14 ounces. The fabrication process is illustrated in detail below.

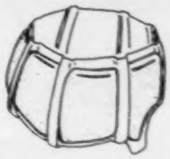
(1) Using plaster bandages, a mold is made of the subject's head which is protected with a bathing cap. A plaster form is made from the mold and ventilation tunnels are added to provide cooling.



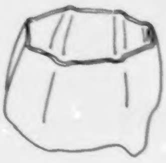
(2) The plaster form is covered with two ordinary stocking caps to provide a comfortable fit in the final helmet. Using ¼" Pelite, a liner is vacuum-formed over the form with the ventilation tunnels and stocking cap covering. The Pelite liner is then trimmed to the hair line.



(3) ¼" T-Foam pads are glued in place over the liner.



(4) A final outer liner is vacuum-formed over the form to seal the "sandwich."



III. Results

In the Fall of 1977, information on the Laboratory's newly developed helmet was published in the project's newsletter, Response, in the Epilepsy Foundation of America's newsletter, Spokesman, and was later cited in several other publications such as the Physical Therapy Journal. This publicity prompted a deluge of interest from across the country. In selecting persons to test the helmet, however, the Laboratory was limited by funding restrictions and practical considerations of the custom process to working locally with residents of Region III.

Three Region III residents, all of whom had refused to wear conventional helmets despite repeated head injuries due to falling, were offered an opportunity to test the helmet -- all accepted. The three subjects were provided with custom-formed helmets; two wore the helmets under wigs, and the third fitted his helmet into a golf cap. After more than six months of use, the results have been very promising. None of these subjects has suffered head injury while wearing the helmet, although all have had seizures, many of which occurred in potentially hazardous areas such as on concrete steps. As the counselor of one subject described:

> "Her fall was backward onto lockers in the shop. Her body became rigid and fell with dead weight directly on the back of her head and shoulders. Her head struck the edge of the metal locker. When we took off the wig with the device we anticipated with the force of the fall and the way her head hit on the metal corner to find a laceration. We found her scalp to be only slightly red, with no apparent thrombosis and no apparent concussion."

As an additional benefit, two of the subjects experienced a marked decrease in the frequency of seizures while wearing the helmet. Neurologists have noted a direct relationship between reduced anxiety and frequency of seizures. In these cases, reduced anxiety may be attributed to the wearer's confidence in the effectiveness of the helmet.

Several problems with the helmet remained. Since concern with appearance precluded the use of straps, securement of the helmet was a problem. The golf cap fit snugly enough to avoid the problem, but the subjects wearing wigs found that Velcro or loose stitching was required to secure the helmet inside a snug-fitting wig.

Ventilation remains a problem with the helmet in its present design. One solution is to abandon the complete helmet and use instead small sections of protective pads on areas requiring head protection. These pads could also be secured with Velcro or loose stitching into a cap or wig. This minimizes total enclosure of the head while maximizing air spaces. The Laboratory has fabricated curved sections of Pelite/T-Foam/Pelite "sandwiches" of about 1½" by 4½" which seem very promising for widespread use. Since the need for custom fitting is eliminated, a larger population could be served. Fabrication time and costs are also reduced. The Laboratory staff feels that this concept would be a valid departure for future research.

IV. Summary

The Job Development Laboratory's concealable helmet for head protection is, admittedly, a compromise of many factors. It is certainly possible to construct a helmet which provides more protection. It can also be argued that, in view of National Bureau of Standards test results, double layers of T-Foam should be the *minimum* thickness allowed in fabricating the helmet. We agree that padding should be as generous as cosmetic concerns allow; unfortunately the double T-Foam helmet was cosmetically unacceptable. Persons concerned with appearance who refuse to wear commercial helmets should be offered an alternative which is lighter, thinner, and less conspicuous than available products. The Laboratory staff feels that the Pelite/T-Foam helmet, though less effective than commercially available models, is an acceptable alternative -- it provides at least *some* protection for persons who otherwise receive *no* protection from head injury due to falling. Further research with a larger population is necessary to verify these results.

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Appendix D

INSTRUCTIONS FOR CONSTRUCTING HAND GUARD I

(partial hand protection)

Purpose: For self-abusive children who bite hands; to be used for feeding and supervised activities.

Materials:
- Rolyan polyform
- Plastic hinges
- Rivits
- Velcro
- 1-inch heavy elastic
- Barge cement

Equipment:
- Electric frying pan (or frying pan & hot plate)
- Hole punch
- Hammer and anvil
- Scissors
- Paper, pencil
- Water
- Deep bowl
- Masking tape

Procedure:

1. Draw a silhouette of child's hand and lower arm.
2. Mark the drawing at: (a) knuckles of fingers and thumbs, (b) wrist, and (c) above the choronoid process of the ulnar (bony protrusion at the little finger side of the wrist).
3. Measure circumference of hand at widest part, including base of thumb.
4. Measure circumference of arm just above wrist at choronoid process.
5. Draw rough pattern of guard using measurements and markings on pattern as guide. Be sure knuckles and first joints are covered and be sure coronoid process will be well protected.
6. Cut paper pattern. Slit at wrist -- leave attached at back of wrist (arm piece will be separate, later joined to hand piece with hinge).
7. Slit pattern between thumb and forefinger.
8. Form paper pattern over hand (masking tape will keep patern in place).
9. Trim pattern to meet in center of palm of hand.
10. Put water in frying pan; turn on burner.
11. Put cold water in bowl.
12. Draw pattern on polyform.
13. Soften polyform in boiling water until soft enough to cut (large piece can be roughly cut on bandsaw first).
14. Cut out polyform pattern, separating arm piece, and set aside.
15. Soften hand piece again until moldable.
16. Shape piece over hand; making it fit securely without being too tight. Watch pressure over knuckles and be sure hand piece starts exactly at the wrist (extend wrist to be sure).

17. When satisfied with shape, carefully dip hand with guard into cold water to set. Be careful that the mold does not get out of shap in the process of putting it in the water. If more convenient, the hand may be put under running water instead of in the bowl.

18. Check hardened guard for fit; mark if trimming is needed. Resoften and shape if needed (steps 15-18).

19. Mark guard for hinge and attach with rivits.

20. Soften arm piece only. Mold to cover lower arm comfortably. Be sure guard joint is right at wrist when wrist is extended.

21. Set in cold water.

22. Mark guard for: (a) elastic across distal portion of palm; (b) Velcro attachments at base of hand, and (c) arm piece.

23. Check for rough edges -- soften and smooth with fingers.

24. Moleskin may be placed under rivits to prevent irritation.

See the attached diagram -- the dotted lines show the pattern of Hand Guard I (partial hand protection).

INSTRUCTIONS FOR CONSTRUCTING HAND GUARD II

(full hand protection)

Purpose: For self-abusive children who bite hands and wrists. To be used when child is not closely supervised. Gives more protection than Hand Guard I since fingers and thumb are completely covered, but allows the child to participate in gross motor activities such as playing ball.

Materials and Equipment: The same as for Hand Guard I

Procedure:

1. Draw silhouette of child's hand and lower arm.
2. Mark wrist and above coronoid process of ulnar (bony prominence at little finger side of wrist).
3. Measure circumference of widest part of hand including base of thumb.
4. Measure arm just above wrist over coronoid process.
5. Draw rough pattern of guard using measurements and markings on pattern as a guide; be sure pattern extends well beyond ends of the fingers.
6. Cut paper pattern. Slit at wrist -- leave attached at back of wrist (arm piece will be separate, later joined to hand piece with hinge).

7. Form paper pattern over hand using masking tape to hold in place.

8. Trim pattern to meet in center at base of palm and to overlap loosely over fingers.

9. Put water in frying pan; turn on burner.

10. Put cold water in bowl.

11. Draw pattern on polyform.

12. Soften polyform in boiling water until soft enough to cut (large piece can be roughly cut on bandsaw first).

13. Cut polyform pattern; separate arm piece.

14. Soften hand piece again enough for molding.

15. Shape piece over hand, making it fit snugly at the base of the hand. Overlap the distal portion of the guard. Be sure fingers can be moved inside. Fuse the distal portion (do not fuse lower than the proximal joint of the thumb). (see overlap on pattern).

16. Set in cold water.

17. Soften arm piece.

18. Mold arm piece with hand piece in place. Be sure joint is exactly at wrist, and make the wrist piece snug to prevent guard from sliding down.

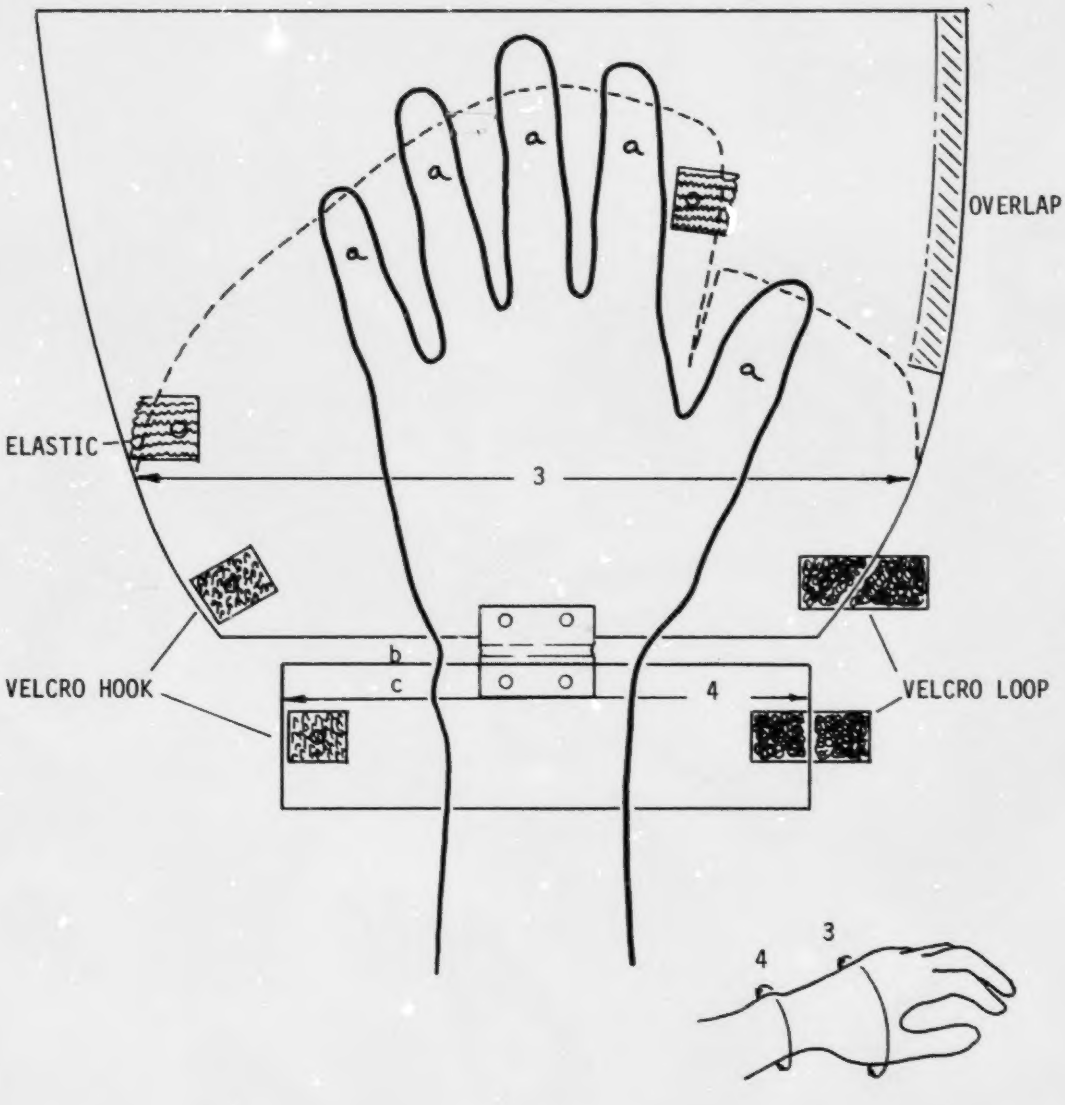
19. Set in cold water.

20. Mark for (a) hinge; (b) Velcro attachments at base of hand, and (c) arm piece.

21. Attach hinge with rivets and Velcro with barge cement. (Note: the child may try to remove the guards with Velcro attachments. It may be necessary to use adhesive tape instead or until the child becomes accustomed to the guard. Our experience is that the children like the guards and do not want to remove them.)

23. Moleskin may be placed under rivets to protect arm from irritation.

See the attached diagram -- the solid lines show the pattern of Hand Guard II (full hand protection).


a
a
a
a
a
a
OVERLAP
ELASTIC
3
VELCRO HOOK
b
c
4
VELCRO LOOP
4
3

HAND GUARD I: dotted line pattern

HAND GUARD II: solid line pattern